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SURVEYING AND MAPPING

Robert C. Eller, *Editor-in-Chief*

A QUARTERLY JOURNAL
DEVOTED TO THE ADVANCEMENT OF THE SCIENCES
OF SURVEYING AND MAPPING

Volume XIV, No. 1
January–March 1954

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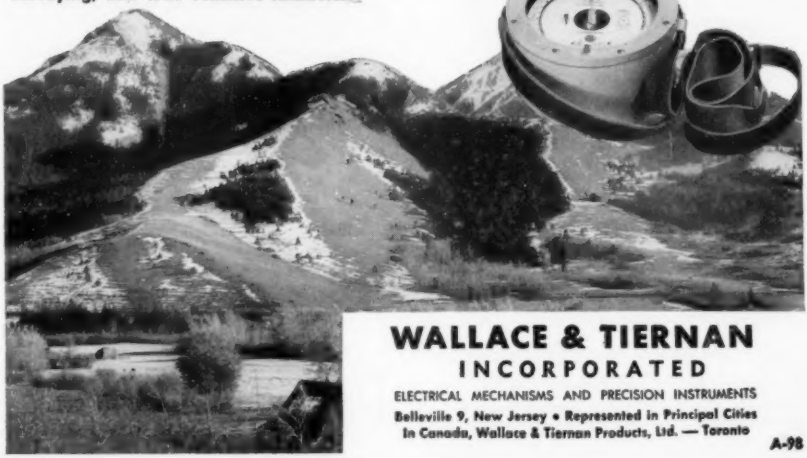

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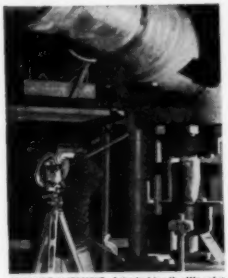

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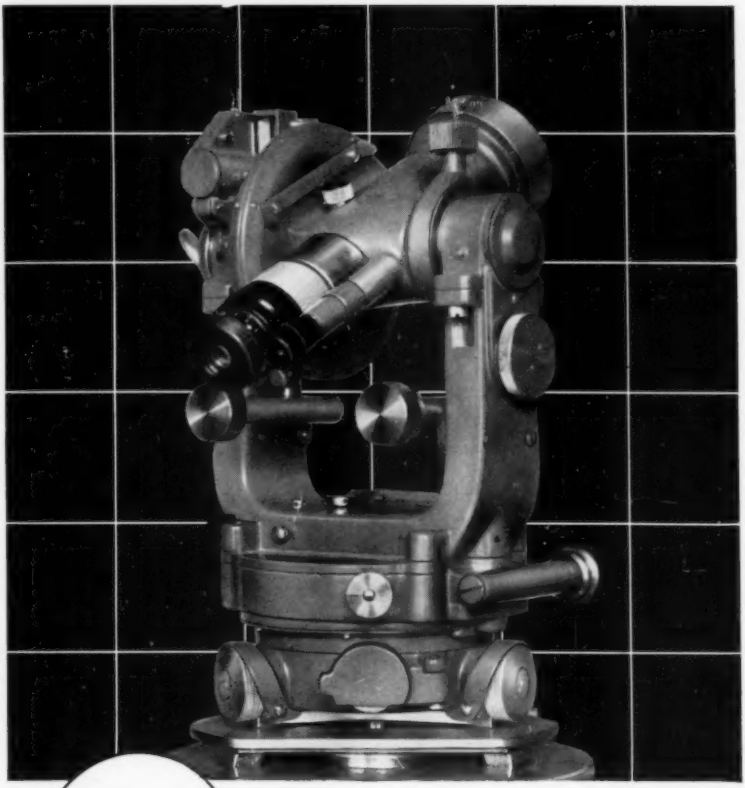

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Gurley Transits Set Gold Cup Course

"Men behind the buoys": Phil Bessor (with chart) and BMC Lester Green discuss course. Bessor says: "We especially appreciated the Gurleys on mile shots where accuracy was the same as at 500 ft."

"For three consecutive years now, the accuracy of the Gold Cup Regatta course has depended upon Gurley transits," reports Phil S. Bessor, Registered Engineer and Land Surveyor of Bellevue, Washington. "In 1951, '52, and again in '53, we were commissioned to design and lay out the race course on Lake Washington, Seattle. In '53, the course was 3¾ statute miles.

"Long before the buoys were set, there were many technical problems to be solved. The course had to be drawn and approved by the American Power Boat Association in Detroit. Curves had to be far enough from shore to prevent spectator mishaps. Naturally, we also kept in mind the best possible course for spectator viewing—as well as location of underwater cables, bridge clearances and the like.

"The Coast Guard tender *Rhododendron* worked with us in setting the 22 marker buoys which were anchored by 1450-pound iron balls. We used walkie-talkie communication between ground-based transitmen and the buoy placers aboard ship.

"Four feet starboard...two feet to port": transitman walkie-talkies instructions for laying buoys to tender. Even in fog, buoys were easily spotted with Gurleys.

"All buoys were set by triangulation, using three Gurleys—two transits on the Seattle shore line, a third on Mercer Island. All points were USC&GS monuments. Some were set as far back as 1901, so they were rerun and checked. Some shots were as great as 7300 feet, and setups were as long as nine and one-half hours at a stretch. We worked in hot and cold weather, wet and dry—with water as deep as 378 feet.

"On the morning of the big day, we set up again, and checked once more to make sure the buoys were still on line. We saw the race only through our transits, since we checked constantly to see if the markers had moved. After the race, the course was again checked for the official report.

"With the great accuracy required, the long distance shots, the time and weather and many other elements, I was glad to have Gurley transits on the job, just as I was when first using a Gurley 23 years ago."

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CUMULATIVE INDEX, VOLUMES XII AND XIII ..... I–X

Opinions or assertions expressed in articles in this Journal do not necessarily represent the official views of the CONGRESS.

(Courtesy Joslyn Memorial Art Museum, Eugene Kingman, Director)

A view of a popular and dramatic cartographic exhibit at Omaha's Joslyn Memorial Art Museum during October and November 1948 entitled *Time, Space, and Maps.* A focal point of the exhibit was this series of eight panels featuring ancient maps arranged around a suspended globe. The crescent-shaped map in the background was formed by joining a number of sheets of the 1:1,500,000 scale map of the world prepared by the Office of Strategic Services during World War II. (*See* "Cartographic Exhibits," page 18.)

Competitive Bidding Versus Professional Status*

By S. A. BAUER

CHAIRMAN, PROFESSIONAL STATUS COMMITTEE, ACSM

A PERENNIAL PROBLEM of surveyors and mappers is that of preserving their professional status. In spite of the fact that the courts have long given surveyors the same legal responsibility as other fully recognized professions—namely, the professional prerogative of liability limited to the exercise of ordinary care, skill, and prudence—nevertheless there periodically occur situations in which the professional status of surveyors and mappers is questioned.

For many years one of the stumbling blocks in the path of full professional recognition for surveyors and mappers was the fact that we were listed in the U. S. Census occupational directory under the heading "semiprofessional." As a result of concerted effort on the part of The American Congress on Surveying and Mapping, that classification was changed in 1950 to the title of "Professional, Technical, and Kindred Workers." It is under this classification that architects, engineers, lawyers and judges, authors, clergymen, physicians and surgeons, and others also appear.

However, in January 1953, solicitation of bids for engineering and surveying services was demanded in connection with a proposed topographic and location survey for a Federal Government agency at American Lake, Wash. Firm protest by the Committee of Professional Relations of The American Society of Civil Engineers brought a reply from the Federal agency, in April 1953, to the effect that "it is not the intent of [this agency] to have professional engineers participate in competitive bidding on a price basis. Therefore, a procedure has been established whereby in the future, when engineering services are required on a contract basis, field stations concerned will be delegated specific authority to secure services by negotiation. . . ."

Nevertheless, periodically attempts are made, and probably will continue to be made, to downgrade surveying and mapping to a nonprofessional level. How, then, can we best protect ourselves against such attacks?

Let us first try to determine the meaning and significance of the words "profession" and "professional."

We quote the following definitions from Webster's *New International Dictionary, Second Edition:*

PROFESSION—(*a*) The occupation, if not purely commercial, mechanical, agricultural, or the like, to which one devotes oneself; a calling in which one professes to have acquired some special knowledge used by way of either instructing, guiding or advising others, or of serving them in some art; the three professions or learned professions is a name often used for the professions of theology, law or medicine;

(*b*) Broadly, one's principal calling, vocation or employment.

PROFESSIONAL—(1) Of, or pertaining to, a profession, especially a learned or skilled profession, as professional training or ethics . . . ;

(2) Characteristic of, or conforming to, the ethical standards of a profession or an occupation regarded as such. . . .

The following is quoted from the Taft-Hartley Law:

The term "professional employee" means:

(*a*) Any employee engaged in work (*i*) predominantly intellectual and varied in character as opposed to routine mental, manual, mechanical, or physical work; (ii) involving the consistent exercise of discretion and judgment in its performance; (*iii*) of such a character that the output produced or the result accomplished cannot be standardized in relation to a given period of time; (*iv*) requiring knowledge of an advanced type in a field of science or learning customarily acquired by a prolonged course of

* *See also* "Competitive Bids for Surveying Services" under Comment and Discussion in this issue.

A view of a portion of the exhibit was this series of eight panels featuring ancient maps arranged around a suspended globe. The *Space, and Maps.* A focal point of the exhibit was this series of eight panels featuring ancient maps arranged around a suspended globe. The crescent-shaped map in the background was formed by joining a number of sheets of the 1:1,500,000 scale map of the world prepared by the Office of Strategic Services during World War II. (*See* "Cartographic Exhibits," page 18.)

specialized intellectual instruction and study in an institution of higher learning or a hospital, as distinguished from a general academic education or from an apprenticeship or from training in the performance of routine mental, manual or physical processes; or

(*b*) Any employee, who (*i*) has completed the course of specialized intellectual instruction and study described in clause (*iv*) of paragraph (*a*) and (*ii*) is performing related work under the supervision of a professional person to qualify himself to become a professional employee as defined in paragraph (*a*).

The following is quoted from "The Engineering Profession," by Messrs. Hoover and Fish:

A calling has become a profession (1) when to practice it one must have acquired a fund of special, organized, theoretical learning and training in applying it and (2) when it recognizes that, above each member's responsibility to his client, his colleagues, and himself, is his responsibility to the public.

One of the fullest discussions of professional qualifications was written by Dr. W. E. Wickenden under the title "The Second Mile." In that paper Dr. Wickenden lists four qualifications which he calls the legs of the table in that "they give a profession a stable base of support." Those four qualities he lists as:

(1) an attitude of mind;
(2) a kind of work;
(3) a special order in society;
(4) a confidential relationship between a client and his agent.

Dr. Wickenden says further:

What is the distinctive mark of the professional man? First, we may say that it is a *type of activity* which carries high individual responsibility and which applies special skill to problems on a distinctly intellectual plane. Second, we may say that it is a *motive of service* associated with limited rewards as distinct from profit. Third is the *motive of self-expression*, which implies joy and pride in one's work and a self-imposed standard of excellence. And fourth is a conscious *recognition of social duty* to be fulfilled among other means by guarding the ideals and standards of one's profession, by advancing it in public understanding and esteem, by sharing advances in technical knowledge, and by rendering gratuitous public service, in addition to that for ordinary compensation, as a return to society for special advantages of education and status.

Next, what attributes mark off the corporate life of a group of persons as professional in character? We may place first a *body of knowledge* (science) and *art* (skill) held as a common possession and to be extended by united effort. Next is an *educational* process based on this body of knowledge and art, in ordering which the professional group has a recognized responsibility. Third is a *standard of qualifications* for admission to the professional group, based on character, training, and proved competence. Next follows a *standard of conduct* based upon courtesy, honor, and ethics, which guides the practitioner in his relations with clients, colleagues, and the public. Fifth, we may place a more or less formal *recognition of status*, either by one's colleagues or by the state, as a basis for good standing. And finally, there is usually *an organization* of the professional group, devoted to its common advancement and its social duty, rather than to the maintenance of an economic monopoly.

Now, how do we as surveyors and mappers qualify under these various definitions? Surveyors of necessity must undergo a long period of education and training in mathematics, the sciences, and their applications, before being properly qualified to perform such work. The land surveyor, in addition, must be thoroughly grounded in the ramifications of the law of boundaries, local statutes, their interpretations, and court decisions dealing with land titles. The surveyor must maintain a position of complete impartiality of opinion, and must render advice to his clients based upon his accumulation of education and experience.

Surveyors and mappers, through their professional societies, particularly The American Society of Civil Engineers and The American Congress on Surveying and Mapping, have imposed upon themselves certain ethical restrictions closely akin to those of other recognized professions. In The American Congress on Surveying and Mapping, many of the Divisions have established standards of practice of high order, and have imposed upon themselves the responsibilities to the public welfare in keeping with professional practices of other groups. These responsibilities extend in some localities to the prohibiting of advertising in nontechni-

cal journals, even to the prohibition of boldface listings in telephone directories, and other such details of conduct generally followed by the medical and legal professions.

One of these limitations which has been self imposed has been the restriction against bidding for work on a price basis. This restriction again is in keeping with similar restrictions in other recognized professions. The theory in back of this restriction is that, since we are dealing with professional service, the value of which is dependent upon the ability, knowledge, experience, and integrity of the individual, a comparison of price for service will in no manner calibrate the value of the service rendered.

It is difficult enough for a specification clearly and unequivocally to define a specific piece of work in a manner that would be uniformly interpreted. It is impossible to make a specification that will equate such intangibles as education, experience, and professional consciousness.

One of the more recent attacks on the professional status of engineers in general appeared in a recent issue of one of our leading technical publications. The situation to which that publication referred revolved around the request for bids for the design of a bridge for a State highway department. The fact that seven offices submitted bids, in spite of restrictions against such bidding on the part of most engineering societies, was considered as an argument in favor of such bidding. It was argued further that bids showing a spread of 259 percent proved the value of such bidding.

It would be much sounder to argue that a spread of 259 percent in bids could indicate only the complete inadequacy of the specifications even to define the work to be done, let alone equate the ability of the bidders.

History has accepted theology, law, and medicine as the so-called "learned professions." Other fields can earn the privilege of professional status by imposing upon themselves the restrictions and responsibilities that professionalism involves, the pattern for which has been set primarily by the legal and medical professions. That program has been followed by surveying and mapping societies and is the foundation of The American Congress on Surveying and Mapping. We surveyors and mappers insist on our claim to profesional status, but must, however, be ready to prove to the world for some time to come, by our self-discipline and devotion to the public welfare, that we are a part of the family of professional men, and entitled to the privileges and respect which is their due.

Mississippi River Commission Publications

An index map to Mississippi River Commission quadrangle sheets within the Alluvial Valley has been published by the Commission. This index map, dated November 1952, contains on its reverse side a status of publication of these quadrangle sheets. No charge is made for this index map.

The Mississippi River Commission has recently prepared a list of quadrangle sheets by States, counties, and Louisiana Parishes. Another list of quadrangle sheets containing the date of edition of each map shown has also been published by the Commission. There is no charge for these up-to-date lists.

Another publication of the Commission is a symbol sheet entitled "Standard Symbols for Quadrangle Maps of the Alluvial Valley of the Mississippi River." This symbol sheet, which is the same size as the quadrangle maps, and useful for their proper utilization, is printed in colors and priced at 10 cents per copy.

A folder of bench marks, descriptions, elevations, and geodetic positions, which is revised as conditions necessitate, is available for each quadrangle map at 20 cents per copy.

A list of available advance sheets, subject to correction, including maps not previously published and revised editions of earlier maps, has also been prepared by the Commission.

All of the publications cited above are available from the Mississippi River Commission, P. O. Box 80, Vicksburg, Miss.

Cartographic Exhibits

By WALTER W. RISTOW
THE LIBRARY OF CONGRESS

IN THE fall of 1952, four Baltimore institutions collaborated in presenting, at the Baltimore Museum of Art, an ambitious exhibition of historical maps entitled *The World Encompassed.* Described by a leading newsmagazine as "the biggest and best map show ever seen in the United States," the exhibit included nearly 300 maps which were gathered from a number of private and institutional collections in Europe and the United States.

While it may well have merited the designation "biggest and best," *The World Encompassed* was not the first map exhibit to be presented by a major gallery. Within the past ten years at least fifteen American museums and libraries have arranged large and distinctive cartographic exhibits. All of these shows were well attended and a number received enthusiastic newspaper and magazine reviews.

This all leads to one obvious conclusion. People are interested in maps and in the information they portray. As map librarians and geographers it is our pleasure and responsibility to stimulate and broaden that interest. Granted, we cannot all hope to plan and arrange exhibits of the scope and magnitude of *The World Encompassed.* Within every map collection there is, however, abundant material for preparing entertaining and educational cartographic exhibits on a great variety of subjects. With a little time, a little thought, and a lot of enthusiasm, you too can have attractive map displays.

EXHIBIT OBJECTIVES

The first step in planning an exhibit is to establish an objective. A display of newly-acquired maps is one of the easiest to plan and to arrange. It nevertheless pays big dividends in promoting interest in your collection. Such an exhibit can include unrelated items or it may feature several examples of one specific type such as pictorial maps, aeronautical charts, or city plans. Rare and valuable cartographic items received by gift or purchase should, of course, be proudly displayed. New accessions might be a regular feature of your exhibit schedule. The number of such displays arranged during a year will naturally depend upon the volume of incoming maps, as well as upon the general character of your collection and the interests of your readers and visitors.

Significant anniversaries and holidays can be recognized with appropriate exhibits. The birth or death dates of notable explorers, cartographers, military leaders, scientists, and statesmen may be honored by showing maps of reigons with which they were associated. Thus, the one hundred and fiftieth anniversary of the Louisiana Purchase provided the stimulus for displaying maps of the trans-Mississippi region.

Extremely popular in recent years at the Library of Congress have been a series of exhibits commemorating centennials or sesquicentennials of various States. A number of cartographic items have been included. An exhibit arranged to celebrate a notable anniversary of your city, county, or State will have an appreciative audience and will be well publicized by local newspapers and radio stations.

Selection of historic themes calls for advance planning. In anticipation of such exhibits you will find it profitable to maintain an "idea" file. As ideas occur and when you happen upon potential anniversary dates, file them in the appropriate folder. You might, for example, note that

Presented at the Toronto, Canada, meeting of the Special Libraries Association, June 1953.

your county was first settled in February 1855. A card filed under this date will be a reminder to start laying plans and gathering material for a centennial exhibit next February. If your own collections are weak in historical maps, solicit the cooperation of other libraries. When originals are not available on loan, photographic or photostatic reproductions make satisfactory substitutes.

Some map libraries include in their holdings rare and valuable maps and atlases. Such treasures should be displayed at appropriate intervals provided that exhibit cases offer adequate protection against possible damage or theft. At the Library of Congress, the "Exhibit of the Month" frequently features cartographic rarities from the collections of the Map Division. Exhibits of treasures can often be arranged to coincide with a local convention or with a scheduled meeting of the Trustees or Directors of your library.

Conventions of professional, fraternal, or business organizations can also suggest themes for exhibits of special subject maps. A selection of economic, commercial, and marketing maps will interest visiting salesmen, retailers, or wholesalers. Maps showing distribution and incidence of diseases can be displayed for a medical convention. Historical exhibits will appeal to D.A.R. delegates and to members of historical societies. An American Legion convention can prompt the showing of military and campaign maps.

Another exhibit approach is the "one-man" show. Such a display includes examples of the work of an outstanding mapmaker or publisher. Maps of such "moderns" as Richard Edes Harrison or Erwin Raisz, or the colorful and attractive plates of the old masters Ptolemy, Blaeu, Mercator, or Saxton might be displayed. Representative issues of governmental map and chart publishers, such as the Geological Survey, Army Map Service, or Coast and Geodetic Survey can also be arranged in interesting and eye-catching exhibits.

The cartographic coverage for a given region or political unit provides another approach. Examples of maps at various scales and a selection of special subject maps for a continent, country, or state can be combined in a revealing and impressive display. Such an exhibit will help demonstrate the great variety of maps and the multiplicity of information which they portray.

Most everyone, sooner or later, must turn to the map for assistance in solving some problem. Map librarians are well aware of the inability of the average person to read or interpret maps with intelligence and understanding. Well-planned exhibits can do much to clarify for the lay user some of the technical features common to maps. A series of educational exhibits might be developed around such topics as projections, symbols, color, lettering, scale, or grids. Methods and techniques employed in map surveying, drafting, and reproduction can also be graphically presented.

In our zeal to make the average citizen more map-conscious, let's not forget that most people go to exhibits for entertainment. It is well to plan some displays which are primarily designed for amusement and pleasure. At the Library of Congress we have built popular exhibits around such themes as *Maps for Fun, Springtime on Maps, Christmas Maps,* and *Vacation Maps.* Other displays in a light vein might feature maps of hunting and fishing, gardens and flowers, pirates and treasure, wild animals and birds, food and drink, hiking and canoeing, literary and music activities, or humor and cartoons. Colorful pictorial maps on these and many other popular subjects are available.

A map exhibit featuring current events is always popular. The alert exhibitor will post maps showing locations of air or rail accidents, major disasters such as floods and tornados, or the sites of significant gatherings. The coronation of Queen Elizabeth II offered a grand opportunity for an exhibit of British maps.

Tracing the tide of battle on maps always creates interest. A number of current problem areas might be spotlighted on one map. Thus, on a map of Africa one could call attention to such "hot" spots as Kenya,

The World Encompassed exhibit, held at the Baltimore Museum of Art, October 7 to November 23, 1952, brought together rare cartographic treasures of a number of libraries, museums, and private collectors. One phase of the history of maps (the general theme of the exhibit) is illustrated in this gallery captioned "The age of great cartographers." Note the effective use of false-wall panels with recessed cases, providing appropriate display settings for both flat maps and bound atlas volumes. (*Courtesy the Baltimore Museum of Art, and Miss Dorothy Miner, The Walters Art Gallery, Baltimore, Md.*)

Suez, Egypt, and South Africa. Newspaper headlines exhibited with the maps add a touch of interest.

Maintaining a current events exhibit admittedly is a time-consuming and demanding assignment. If you can possibly spare the time, however, you will find that your efforts will be richly rewarded in increased map consciousness by your readers and visitors.

RESEARCH AND SELECTION OF MATERIAL

A certain amount of preliminary research and examination of materials is necessary before the exhibit subject is chosen. More concentrated study and closer scrutiny of your files will follow selection of the theme. Certain types of exhibits, such as those displaying new accessions, require little or no research. For more ambitious and elaborate displays involving historical or biographical data, the necessary investigations may require as much time and effort as would the preparation of a major professional paper or book.

After you are thoroughly familiar with the subject for the prospective exhibit you are ready to select the material. It is advisable to include in the preliminary selection many more maps than you expect to display. This will permit more latitude in planning groupings and fitting items to available space when actual mounting begins. In making the selection be sure that the maps chosen contribute to the general theme of the show, have definite eye-appeal, and include enough variety to prevent monotony.

SELECTING THE SITE

Thus far we have intentionally avoided mention of where the exhibit is to be arranged. This is in accord with recommendations of experienced exhibitors who hold that it is far more important to settle first the basic questions of why you are exhibiting, the idea you want to get across to the viewers, and what materials you will use to achieve the desired objective.

Many library buildings include exhibit halls or galleries, or have spacious corridors and lobbies in which displays can be arranged. If the map collection comprises one section or department in a large library, there is perhaps strong competition for use of the exhibit hall. By planning exhibits well in advance and selecting subjects which have general appeal, you can very likely reserve the exhibit hall for one or more major cartographic displays each year. Many general exhibits are improved by the inclusion of maps, and your exhibits officer or the heads of other departments will no doubt welcome suggestions for supplemental map display material.

Some display space can frequently be obtained within the map room or near its entrance. Smaller and less pretentious exhibits arranged on a more or less regular schedule can occupy such space.

Potential exhibit places are not restricted to your own building. Anyone with a real interest in displaying maps can find dozens of good exhibit sites within his home community. State capital buildings, county court houses, and city halls are often of an architectural style which includes spacious corridors and entrance halls. Such space can often be had for the asking, particularly if the proposed exhibit features maps of local interest, either current or historical.

Lobbies of banks, hotels, and theaters likewise constitute possible display sites. Lodges, clubs, service organizations, YMCA's and churches, and civic auditoriums or memorials also offer possibilities for the enterprising exhibit planner. Small displays can often be arranged in the window of a department store or of the local newspaper office. An exhibit featuring transportation maps would be especially appropriate in a railway station or bus terminal, and aeronautical charts and aviation route maps can be displayed in the airport waiting room. Few villages are so small as not to have a post office or fire station, and exhibits arranged in such popular gathering places are assured of good audiences.

Few sites are ideal for exhibits. Several basic attributes of a good location should nonetheless be borne in mind in making your

display settings for both flat maps and bound atlas volumes. (Courtesy, The Enoch Pratt Free Library, Gallery, Baltimore, Md.)

selection. Of fundamental importance is good lighting—either natural or artificial. The small type on many maps and the standard cartographic details and conventions require the best possible illumination.

Maps are large in size compared with most other exhibit material. Your site, therefore, should be sufficiently spacious to permit hanging the desired number of maps, besides allowing ample viewing and walk areas. The primary purpose of an exhibit is to bring the material displayed to the attention of the largest possible number of viewers. To attain this objective select a location which is a popular rendezvous or a well-traveled thoroughfare.

THE BACKGROUND OR DISPLAY BOARD

Few standard exhibit cases are designed with maps in mind. Fortunately, however, excellent display backgrounds for maps can be constructed from readily available and inexpensive materials. Prior to the recent move to the Annex Building, the Library of Congress Map Division had an exhibit board, 16 by 64 feet in size, which consisted of a number of 4- by 8-foot sheets of soft wallboard. This large unencumbered surface offered unlimited possibilities for really dramatic displays.

Masonite, plywood, and various other types of wallboard are suitable for use as background material. The softer surfaces, which will take thumb tacks or staples, are more desirable if the exhibits are changed frequently. A cork-surfaced board, although somewhat expensive, is especially well suited as a permanent display board. For one-time exhibits which use expendable maps pasted to the background, hardboard of plywood may be employed. Four- by eight-foot boards, mounted lengthwise along a wall, or on standards three feet above the floor make convenient panels. The number of panels can be adapted to the available space and the scope of the exhibit. In a large open hall panels may be arranged in interesting patterns and groupings for especially effective displays. Both sides of the board may be utilized in some arrangements.

Metal tracks or rails with movable hangers along the top of an exhibit board attached to the wall might be practical. Maps with grommets or eyelets can be hung from such supports. Rand McNally & Company, Denoyer-Geppert, Hagstrom, and other large map companies list such display rails in their catalogs. Most of these companies also can supply swing-wing style displayers. Available with floor standards or for mounting on the wall, such displayers include a number of double-sided exhibit boards. Several library equipment companies have recently introduced display boards with regularly spaced holes in which pegs or racks may be inserted. Books, maps, and illustrations can be combined on such boards.

Some exhibit rooms are furnished with glass-covered display cases. While such cases have advantages for displaying rare and valuable items, they are cumbersome to use, especially if exhibits are changed often. There is also the ever-present danger of breakage in the normal process of opening and closing glass doors or tops.

For permanent display boards a neutral light-reflecting color is recommended. Most maps are quite colorful in themselves and therefore bright backgrounds are not necessary. For large and elaborate exhibits arranged for special occasions, a freer and more dramatic use of background color may be in order.

PRINCIPLES AND TECHNIQUES FOR MAP EXHIBITS

A number of excellent books on exhibit techniques have been prepared by specialists on display and design. Most of the ideas and principles presented in such works may be adapted to cartographic exhibits. For the assistance of my fellow amateurs I present here a few of these "helpful hints" for preparing effective map exhibits.

Whether the exhibit consists of one map or a hundred, it is important to have a central theme or objective. Keep your story simple and tell it quickly and clearly. In selecting a subject remember that beauty, sentiment, drama, and humor are effective

keys to the public's heart. Keep in mind, too, that people are most interested in things and places with which they are familiar.

Your story may be told with a sequence of maps combined perhaps with illustrations and captions. Specialists in design tell us that the human eye reacts most favorably to order, arrangement, and rhythm. Materials should be so arranged that the eye is led smoothly from one item to another.

In an exhibit which consists entirely of maps monotony should be avoided by contrast and rhythm. The monotony of a succession of colored maps might, for example, be relieved by inclusion of several uncolored ones. Maps of different sizes, arranged in various interesting patterns, likewise serve to break monotony.

Prints and other illustrative material, as well as atlases and books, can be used to add variety to the exhibit. Tables and horizontal display cases may be alternated with vertical display boards for additional interest.

You may wish to emphasize an especially significant item in the display. This can be done by hanging it in a prominent location and by leading the viewer, by means of various props or directional signs, to the focal point. Special lighting can also be employed to call attention to the featured item.

One basic principle to remember is not to crowd the display boards. Leave ample space around each map. In general, items should not be exhibited above eye level. Exceptions to this rule may be made in the case of very large maps. In rooms or halls with high ceilings a very striking effect can sometimes be obtained by hanging a series of large wall maps at a high level.

Large exhibits are impressive but viewers get weary wandering through too extensive a show. If the exhibit is a large one you might follow the example of many art galleries and provide seating facilities at strategic and convenient places in the display corridors.

A soiled and dusty exhibit is a displeasing sight. Keep your displays fresh and clean both for esthetic reasons as well as for the good of the materials. It may be advisable to display some valuable items in glass frames or at least to cover them with transparent sheets of acetate or plastic.

The length of time an exhibit is on view depends on a number of factors. It should remain open sufficiently long to enable all who are interested to view it. Displays should be changed often enough to maintain interest. Exhibits arranged for some special holiday or event should be taken down immediately after they have served their purpose. A Christmas exhibit will seem quite inappropriate by the end of January and there will be little interest in a hayfever map when the ragweed season is over.

The average viewer is not likely to spend much time reading lengthy descriptions. A certain amount of explanation is necessary, however, to get your story across. The title panel might appropriately include a statement on the general theme. Make it brief and use type or lettering of adequate size to permit easy reading. A montage of maps makes an eye-catching background for the title.

In preparing titles and captions for individual maps, one should also strive to give the maximum amount of information with the minimum number of words. Poorly executed and unsightly captions can ruin an otherwise good exhibit. Conversely, artistically designed captions, in addition to providing information, can relieve the monotony of a solid line of maps.

Art supply stores have various types of plastic, plaster, or cardboard letters for use in preparing titles or captions. If you are in a large institution with a heavy exhibit program it may pay to purchase an embossograph and/or a bulletin typewriter. Hand-lettered captions are effective when well done, but this is a laborious task even if you have on your staff someone with the skill to do the job. Mechanical lettering guides are helpful aids to the less-skilled draftsman. Typewritten captions, enlarged by photo-reproduction, are quite satisfactory for some exhibits.

Dr. Gilbert Grosvenor's fiftieth anniversary as editor of the *National Geographic Magazine* was recognized in this exhibit of National Geographic Society maps and pictures, on view in the Library of Congress Map Division during April and May 1949. The large display surface, formed of 4-by 8-foot panels of wall board, was effectively utilized in this three-tiered arrangement of small maps, photographs, and large wall maps. (*Photograph courtesy of The National Geographic Society.*)

Interest can be stimulated at times by featuring "Map Facts" on your exhibit board. Study of a globe or map will reveal such eye-opening items as the following:

Santiago, Chile, is farther *east* than Boston.

Colon, on the Caribbean side of the Panama Canal, is farther *west* than Panama City, the Pacific terminus.

All of Great Britain is farther *north* than the northernmost extent of the United States.

The Pacific Ocean occupies one-third of the earth's surface and *more* area than all the land masses combined.

Cairo, Ill., is farther *south* than Richmond, Va.

Reno, Nev., is farther *west* than Los Angeles, Calif.

PUBLICITY AND RECORD

The preparation of an exhibit is a time-consuming task even though an interesting one. Diverting valuable staff time to such work can only be justified if the exhibit has a good audience. To insure this, use every available publicity medium. Prepare posters for display in other parts of the library and, if possible, in other public buildings. Distribute attention-getting press releases to newspapers and radio stations. If the exhibit is arranged for a specific meeting see that the official program mentions it. Provide chairmen with notices to be read at their section meetings. For especially noteworthy exhibits plan an "Official Opening" with printed or engraved invitations, distinguished guests, and an appropriate speech of dedication by a prominent citizen.

In the Library of Congress Map Division we consider the exhibits program an integral part of our reference service. Only through well-planned and well-arranged exhibits can we bring our rich and varied cartographic material to the attention of potential map users. A secondary return from an exhibits program is the excellent training and experience it gives the reference staff. There is no better way to become familiar with the collections than by searching the files for possible exhibit material. Further, research and study essential to preparing a worthwhile exhibit unlocks the door to many valuable and useful cartographic reference aids.

Exhibits are ephemeral things. The life-span of even the most elaborate and successful exhibit seldom exceeds several months. Some displays remain on view for but a day. By means of an exhibit catalog, however, the influence and effectiveness of an exhibit may be extended well beyond its "open" period. The primary function of an exhibit catalog is to serve as a guide to the materials displayed. In its simplest form it comprises a list of titles with perhaps a plan of the exhibit hall to show where each item is displayed. At best the catalog may be a handsomely printed volume, with carefully documented essays for each item, along with bibliographic reference and well-executed reproductions of selected pieces. Of the latter type is the large and attractive catalog for *The World Encompassed,* the exhibition held at the Baltimore Museum of Art, October 7 to November 23, 1952. This catalog, published by the Trustees of the Walters Art Gallery, lists and describes the 282 items exhibited, provides bibliographic references for each piece, gives the name of the individual lenders, and includes 60 collotype reproductions. Such a volume is more than a souvenir of the exhibit. It constitutes, in addition, an outstanding reference work on the history of cartography.

"Man," we read, "has always possessed an instinct for geography. Maps have been the graphic expression of his interest just as exploration has been its energetic release." Through well-planned and attractively-arranged exhibits we can foster and promote popular interest in maps and in the language they speak.

* * *

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graph courtesy of The National Geographic Society.)

The Plot Board

By H. L. THOMSON

LOS ANGELES DEPARTMENT OF PUBLIC WORKS

IN a developing metropolitan area, such as the City of Los Angeles, with the consequent heavy increase in traffic, certain arteries must be enlarged, smoother connections made between offset streets, or new streets cut through blocks. Detailed information concerning the kind, size, and position of the structures within the area involved must be available for certain phases of street design, for writing deeds for the proposed property acquirements, for appraisal, and for condemnation and purchase.

Formerly this information was taken in the field on loose-leaf sheets by the surveyor and then plotted on a map by the draftsmen of each of the various divisions involved—a costly and rather unsatisfactory procedure.

To improve on this system the plot board shown in the accompanying illustration was developed.

This is a device which enables the surveyor to show details of existing streets and structures in a continuous strip along a selected route.

Rollers are mounted on each end of a heavy drawing board to move a strip of special tracing cloth over the board.

Rollers of various kinds attached to drawing boards are not new. The success of this device is due in a very considerable degree to a stable and transparent cloth. The drawing sheet is Phoenix White Pencil and Ink Tracing Cloth, which does not stretch or warp due to moisture, and from which any number of Ozalid prints can be made.

The street lines, street centerlines, lot lines, and sometimes proposed widening lines are inked to scale on this strip in the office before it is issued to the surveyor.

The surveyor plots his control lines on the sheet, possibly along the sidewalk parallel to the centerline, if the street traffic is heavy, or across the tops of buildings in the business district, if the proposed roadway is to cut through the block.

A scale of 20 feet to an inch is used in plotting curbs, sidewalks, building foundations, garages, concrete drives, and any structures which might be of importance in condemnation or, by the necessity of their removal, might influence the roadway alignment or the cost of construction. Important dimensions and offsets from street centerlines are shown on the plot.

When completed, this strip plot is given a title and index number and filed in the vault and Ozalid prints are sent to the division interested.

This strip plot is the surveyor's original field information; it is not a replot nor an assembly from field notes. Thus it has immediate value in court cases.

It has the further advantage that, should the appraisal or condemnation be delayed a year or two, the plot can be brought up to date at any time by field comparison, and new buildings or changes incorporated.

The plot board is made from a drawing board, 32 by 22⅜ inches in size, reinforced by crosspieces on the back.

The special tracing cloth comes in rolls 42 inches wide, which is divided into 21-inch strips. The ⅜-inch plywood end pieces, which support the rollers, are set into the sides of the board and screwed firmly in place. The rollers are hollow fiber tubes 2⅝ inches outside diameter. Turned maple end pieces several inches long fit into the ends of these tubes and pass through round bearing holes in the side pieces. Tripod cover caps or turned wooden caps are fitted to the ends of the maple stub axles so that the rolls can be turned. The bottom strips protect the rolls and, by a device at one end, permit a slight tension to be put on the ends of the rolls, making just enough friction to hold the tracing cloth tight on the board and yet not make the rolls turn too hard.

The 1-inch aluminum angles at the ends of the board protect the tracing cloth as it bends over the rounded ends of the board. They are carefully set square with the board and parallel with each other, so that they furnish a true edge for the use of a T-square.

The top of a tripod cap is turned flat and fastened by screws to the bottom of the board at its center, so that the board can be mounted on an extension leg tripod. This enables the surveyor to move the board to the different parts of the job, whether on the ground or on a building, and adjust its height to the best working position.

The board is covered with green-coated drafting board cover paper which makes a better backing for drawing on the tracing cloth, as well as being easier on the eyes.

A light canvas top is fastened by strings at the corners and covers the work both to protect it from smog particles and from smudging the pencil lines by working over them.

Window flaps are cut in one corner of the cover so that, by turning the rollers, one half of the sheet for its whole length can be brought progressively under the window. By turning the cover half way around, work can be done on the other half of the sheet.

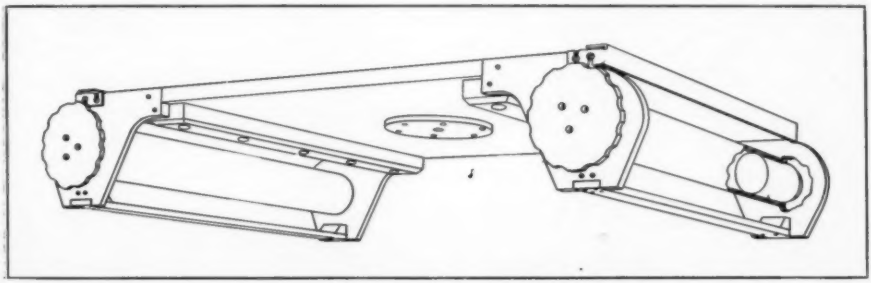
It is recommended that the surveyor new to this work draw lines and figures of different weights on a small sample of this tracing cloth, have an Ozalid print made, and study the result.

A pencil with a slightly rounded point rather than a sharp one should be used. The makers of the cloth recommend Mars Lumograph pencils, which make the dense black lines required for a clear print, yet smudge very little in use.

The tracing cloth should be thoroughly rubbed with tracing-cloth powder before being used, not only to absorb the slight oiliness of the surface but to roughen it very slightly, so that it will take the pencil better.

A planetable alidade and the plot board have proved to be a satisfactory combination for taking strip topography. A planetable plate is substituted for the tripod head cap on the board so that a Johnson head tripod can be used. Work near the end of the board can be brought to the center and triangulation or traverse control points which might ordinarily be located on another sheet can be brought into a working position on the board.

The length of the individual sheets may run from 10 to 14 feet, depending on the changes in the general direction of the preliminary line. The best length can be determined by laying out a strip 1,000 feet wide over a plat of the preliminary transit line, bearing in mind the slopes to be taken. A 5-foot contour interval and a scale of 50 feet = 1 inch are used in hilly sections. After the topography on a sheet has been completed, any number of Ozalid prints may be made at once for use as work sheets. If the preliminary transit line has been coordinated and the grid placed on the trac-



THE PLOT BOARD AS VIEWED FROM BELOW

ing-cloth sheets, the coordinates of the control points of the final alignment can be scaled from the grid squares of the prints. Where a very broad strip of topography is required for off- or on-ramps for an interchange, controls are thrown out from the preliminary transit line toward the edge of the sheet. The grid squares at one side of the supplemental sheet are placed over those at the edge of the principal sheet and the border contour lines and control points copied through. The supplemental sheet can then be placed on the plot board and the contours completed to cover the desired area. The Ozalid prints may be trimmed and joined along a grid line.

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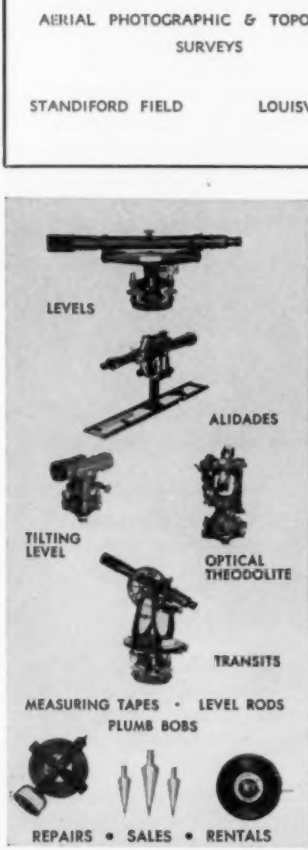

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How Much Topographic Detail?

By ROBERT H. LYDDAN
U. S. GEOLOGICAL SURVEY

(EDITOR'S NOTE—Mr. Lyddan spoke extemporaneously. This paper is based on the stenotypist's transcript of his remarks and the ensuing discussion.)

THERE is a character in "The Hunting of the Snark" who achieved a rather unique distinction in that the map that he made pleased everyone. Here is how Lewis Carroll puts it:

He had brought a large map, representing
the sea,
Without the least vestige of land;
And the crew were much pleased when they
found it to be,
A map they could all understand.

A map they could all *understand.* I want to emphasize the word "understand," because the readiness with which a map can be understood is definitely a measure of the quality of the map, or the expertness with which the mapmaker worked when he was making it. The understanding of a map, in turn, is a measure of the readability of the map. I have the belief that we, as mapmakers, are prone to see this problem through our own eyes rather than through the eyes of the map users, who may be a lot less adept than we are at readily reading the map and getting the intelligence out of it that we attempted to put into it.

You probably know, or have read about, certain studies that have been made by newspaper publishers, attempting to determine the things which would make their product more readily understandable or readable. I have in mind the thought they give to such things as the selection of type, the spacing between the letters, the spacing between the words, whether there will be two narrow columns on one page in place of one column, and so on. They have made rather scientific studies of the problem of readability, all in an effort, obviously, to give their customer the thing that is most useful to him.

I don't want to imply that there has been nothing done along that line by mapmakers. Those who advocate the designing of our map symbols so that, if possible, they represent to some extent the feature that is being symbolized, are obviously working in that direction.

I would like to invite comment from any of you who have some thoughts on the following questions: Do we need to make some sort of a specific study of the readability of our maps to determine whether we are loading them too heavily, whether we need to use different colors, whether we need different symbols, whether we need any rather definite changes in order to better accommodate the map user?

In order to move this subject into a more limited channel, I will focus attention on the 1:62,500 scale topographic maps that are issued by the Geological Survey for general use. A rather sharp comparison can be made between the appearance of the maps made in this country and those that are published in Europe. The French and the Swiss, and to some extent the British, put a lot more information and a greater variety of information on their maps than we do here in this country. I think probably the most significant difference is the greater extent to which they show planimetric detail.

Recently, I was looking at a 1:50,000 scale French map on which I believe all the fence lines in that area were shown. It was a rural area, but was scattered over with towns and villages of considerable size. On the same map I noticed that they distinguish

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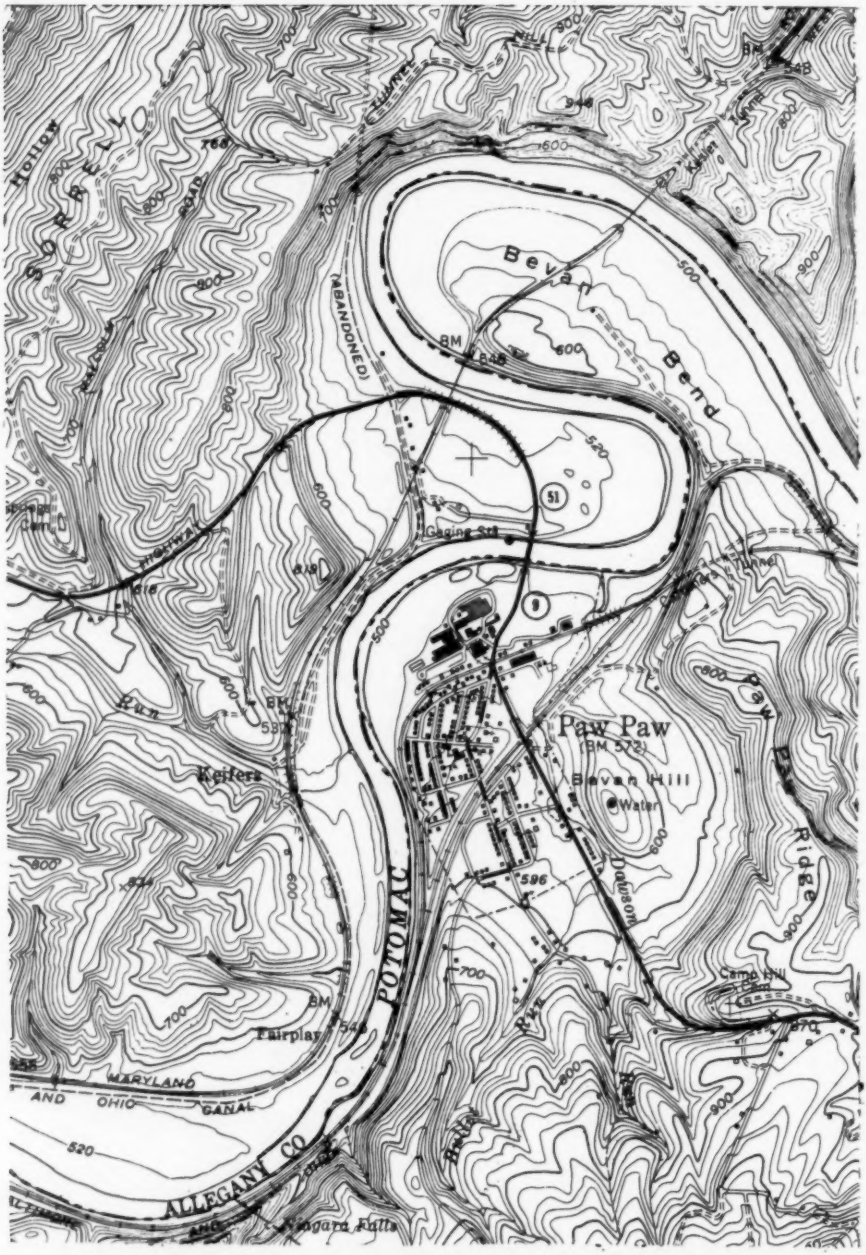

A portion of a standard topographic map published by the U. S. Geological Survey. Scale 1:24,000.

A portion of a standard topographic map published by the Institut Géographique National, France. Scale 1:20,000.

between wells, ponds, cisterns, and springs —mind you, on a 1:50,000 scale map covering about the same area as one of our 15-minute quadrangles.

I can imagine what would happen to our mapping costs if our field men, especially here in the Eastern States, were required to peep into each post hole to determine whether it was a cistern, or a well. That would be a ridiculous thing for us to try to do in this part of the country. In the West, where water is a very important and sometimes critical commodity, water features are very significant. There we might ask whether there is a need for greater detail than is now shown on our maps.

The first objection that will be raised against any moves in that direction will be based on comparative costs. Undoubtedly, the gathering of map detail costs money, and preparing it for publication also is an expensive thing. The European mapmakers, I imagine, have one edge on us in that the cost of skilled labor such as drafting or engraving is low, compared to the wages we pay for such services in this country. Even so, I think some serious study might be given to this question: Should we, or could we, better accommodate the map users if we adopted more of the policies and systems used by the European mapmakers?

Another interesting characteristic of the European topographic maps is that frequently a combination of contours and other symbols is used to show the topography. For example, a cliff may be shown by a symbol independent of the delineation that is given the same feature by the contours, similar to the treatment that is given to glaciers in this country.

It occurs to me that, in place of increasing the costs of our mapping, we might have an opportunity to lower costs by greater use of symbols and by making less of an effort to bring out features by contours. I can think of a hypothetical case where a rather significant cliff is the most important topographic feature on the map, but the contour, if the interval is fairly large, might not even show it. For example, 20-foot escarpments might be the most significant landmarks on a given map, but if the contour interval is 40 feet the cliffs will not be shown at all. An effort to show them by going to a smaller contour interval will obviously run up the cost and possibly still not show the feature as clearly as could be done by a symbol.

One thing further that is immediately apparent in studying the European maps is that the contour interval usually employed is much larger than would be used on similar maps made in this country. I am not sure that I know what the reason is. One thing is obvious, however—the larger contour interval does permit them to show more planimetric detail on their maps than we are able to show. I personally feel that we have gone entirely too far toward small contour intervals in our mapping here in the past, and I am quite pleased to notice a trend toward a loosening up, so far as contour intervals are concerned. I am sure that this will tend to make our maps more readable.

I would like especially to get some comments on the question of whether you think we would be doing better to drop some of the contour information in order to show more planimetric detail.

I want to point out one of the principal dilemmas in which we invariably find ourselves when we debate these matters; that is that we are mapmakers talking to other mapmakers rather than mapmakers talking to map users. It is unfortunate that we do not have a forum by means of which the mapmakers could just toss questions such as these to map users and get specific answers, specific suggestions, and specific comments from them.

There are some who claim, with some justification, that we *have* such a forum and we have been using it for a long time. We have been making topographic maps for 50 to 100 years in this country, even longer in some of the Federal agencies. During that time, countless comments, suggestions, and criticisms have been received from the map users, thus providing the intelligence on which we have based our map design. The reactions of the map users

have been consistently sought, I am sure. I fear, however, that that process moves so slowly that the mapmakers are actually a step behind the map users.

I have the pet notion that some sort of a systematic study might be made of this subject which would yield very beneficial results. I don't have in mind a simple canvass. I would be the first to claim that you cannot get anywhere going out and seeking the opinion of every tenth man that you meet going down the street. You cannot even ask every tenth map user and get opinions that would be worth much. The questions have to be put to map users who are very intelligently selected. You also have to put them in possession of some very pertinent facts regarding comparative costs, or else their opinions are not going to provide you with much that you can use.

I would like to raise the question of whether a systematic study of the "consumers choice" might be profitably made in the field of mapping, and how such a study might be launched.

To every mapmaker, the question of what kind of map he should try to make is an extremely important one. I believe that the success with which we arrive at the right answers to these questions will largely determine our success as mapmakers.

DISCUSSION

CHAIRMAN GRIFFITH: Thank you, Mr. Lyddan, for your usual excellent job. I think that possibly the snark-hunting map might have had some detail on it if it had been made by the Coast and Geodetic Survey. It would at least have had soundings on it.

MR. STANDARD: I would like to say that we have found the standard quadrangles very useful in our operations in the oil industry, because we are continually going into new areas where there have been no other operations. The first thing that we have to know is how to take in the drilling equipment. Drilling equipment is usually very heavy. For instance, we want to know whether the ground will hold up our equipment with merely putting down some gravel, or will we have to go into more heavy construction. Frequently a study of a topographic map will indicate the type of ground we may have to cross. That may determine part of our costs, and naturally we want to know how much we are going to have to spend to get in there.

Now, as to the scale of the maps, I think the scale of 1:62,500 is about right. I much prefer a map of 1:62,500 covering the larger area rather than one on a larger scale covering a more limited area. In Louisiana and Mississippi, and those States down there, there are many areas where you don't have quadrangles at any scale. So I would recommend making more maps, and making them of the 1:62,500 scale, and not try to show too much detail, but just give the general features.

CHAIRMAN GRIFFITH: Would you care to comment on that, Mr. Lyddan?

MR. LYDDAN: The willingness to do with less detail in order to get greater coverage is soundly anchored, I am sure. I remember a man in Oregon who probably spent more time during his life thinking about maps than anyone else not engaged in mapmaking. This man insisted that we were wrong in not trying first to complete the 30-minute quadrangle coverage of the country. He urged that we should get that done, and then go back to the 15-minute quadrangle, and then to the 7½-minute quadrangle series as needed. His thought basically was in line with yours, Mr. Standard, that what is needed first is complete coverage of fair quality, rather than very high quality in some areas with no maps at all in others.

MR. BRIERLY: I am interested in the topographic detail from the field mapper's point of view.

Now, you can't go into the study of maps of Europe—for example, the Italian topographic maps at 1:25,000, the Netherlands maps at 1:25,000, or the maps of Great Britain at 1:10,560 to cover the entire country—and use them in the field without realizing that our own topographic maps are very short on detail.

One thing that you mentioned, Mr. Lyddan, was cutting down the detail. If you are mapping morainic formations, glacial flow, kames, cliffs, terraces, and things of that nature, you should go to considerable detail in order to show these features properly.

The whole problem hinges on two factors. One is the cost of production, and the other is the use. Now, on the use problem, I think it unfortunate that the government services have had to cater to the people who are using the maps while those people are not fully aware of the advantages of detailed maps. One way of getting around that problem is to educate the public on reading a map and utilizing it to the fullest extent. That is one item.

Another problem, it seems to me, is that of finding means of putting more detail on the maps. I would like to see more detail shown on them, not only the planimetric detail, but also the topographic detail.

The British have solved the problem by making one great survey of the entire country at 1:2,500, and supplementing it in cities with mapping at 1:1,250, and, in some instances, 1:500. I realize the cost would be tremendous, but in the long run those surveys, once completed, can be used for whatever purpose is desired. The maps can be put out in tremendous detail, or they can be put out as generalized maps.

From my experience, any move in the direction of omitting some of the detail that we now put on the maps would be a big mistake.

CHAIRMAN GRIFFITH: Mr. Lyddan, do you want to comment on that any further?

MR. LYDDAN: Only to point out that the question of educating the map users as to how to make use of more detail is somewhat in line with the topic of "Popularizing Map Use" that Mr. Stoneman and his group so ably handled here yesterday. They are not pointed exactly in that direction at this time; they are shooting at the broader subject of educating people that there *are* maps. But your suggestion would be a refinement of the same thing. I think, undoubtedly, that education is probably the most fertile field that we as mapmakers have to work in.

MR. NORCROSS: I would like to ask this question: Will it not be practical and advisable to engage more in the making of special-purpose maps? I think we would all agree that it is impossible to make a general-purpose map that will answer all the requirements. I remember very particularly a map of Italy that could not be easily used even when a magnifying glass was used on it.

Now, we have a tremendous number of different uses in our country. My question would be this: Will it not be advisable and practical, considering cost too, to simplify the black base, and then, by a system of overlays or overprints, prepare special-purpose maps for the different uses that might be required? For instance, there might be a particular need for a map for soils, or forestry, or grazing, or what not, or there might be a map on which it would only be required that planimetric detail be shown. In that way, we could satisfy the map users more generally than we are doing right now, through catering to their specific needs for the maps. If we try to get everything on one map we are going to destroy the usefulness of the map.

MR. LYDDAN: There seem to be two lines of thought that we might take in regard to that question. I am not sure which one Mr. Norcross is suggesting.

As I see it, we could adopt a policy of making a group of special-purpose maps without attempting to make any one general-purpose map. That is possibility "A." Possibility "B" might be to make first the master map that has everything on it. That map would not be used directly, but from it would be made the special maps showing the planimetry, the physiography, the forest coverage, and so forth. I imagine that the latter is what you have in mind, isn't it?

MR. NORCROSS: No; my thought was that you make the black base more simple, something that would be required in all maps. But let there be added by overlays, or overprints, the specific information of the kind that would be required for the specific uses to be made of the map.

MR. LYDDAN: That suggestion could be debated at great length. I would like to see you get some comments from the floor, if possible, Mr. Chairman.

CHAIRMAN GRIFFITH: Does anyone else care to comment on that?

MR. GLEISSNER: When it comes to the map users' needs, I believe that the State agencies that have so long cooperated with the Geological Survey in topographic mapping are closer to the map user than anyone else. I am thinking primarily now of the two States with which I am very well acquainted. They are Louisiana and Missouri. In Missouri, the State Geologist receives requests for about 20,000 maps a year. In Louisiana, it is building up to about 12,000.

Both of those cooperators feel that one of the greatest needs is to complete the 1:62,500 scale mapping at an early date. In fact, in Louisiana, they do not want to talk about cooperation on 1:24,000 scale mapping until their State is covered completely with the 1:62,500 series.

In discussing the matter with them, I find that they feel that they can revise, or get the extra information that they want, much better if the maps do not carry too much or too many kinds of detail, or do not get out-dated too quickly. That is one attitude that I am aware of. I think it has some weight.

On the question of comparison of European maps with ours, in addition to what Mr. Lyddan mentioned on the costs of producing the maps, the Europeans have the advantage of having been many, many years ahead of us in their mapping programs, and also, they have a considerably smaller area.

At the present time I feel that some of our maps on the 1:62,500 scale have too many different symbols. We distinguish between salt marshes and swamps, and submerged swamps, and I do not believe that that is necessary. We also show, in some cases, borrow pits along roads, which I believe is out of place on a 1:62,500 map, and possibly on 1:24,000 maps. We show spoil banks along ditches. The scale of the map does not permit a true position for that symbol. I think we should simplify our maps and make them more readable.

CHAIRMAN GRIFFITH: Thank you, Mr. Gleissner.

I know this could go on indefinitely. You have certainly stimulated interest in your listeners, Mr. Lyddan. I think, in fairness to our next speaker, that we are going to have to terminate this now. Thank you very much.

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Institute of Geodesy, Photogrammetry and Cartography

THE Institute of Geodesy, Photogrammetry and Cartography at Ohio State University sponsored a symposium on geophysics and physical geodesy on November 12 and 13, 1953, under the direction of Dr. W. A. Heiskanen. The symposium emphasized the significance of gravity studies and gravity measurements for solving important problems of geodesy and geology.

Among the papers presented were the following: "Geodetic Significance of the Solar Eclipses," by Dr. Tauno J. Kukkamaki, Finnish Geodetic Institute; "International Cooperation in Geodesy," by Walter D. Lambert, U. S. Coast and Geodetic Survey, (Ret.); "World-wide Connection of Gravity Base Stations," by Dr. George P. Wollard, University of Wisconsin; "The Topography of the Pacific Ocean," by Dr. Harry H. Hess, Princeton University; and "Island-Arc Geophysical Problems," by Dr. F. A. Vening Meinesz, Utrecht University, Holland. The symposium was supported by the Graduate School and Mapping and Charting Research Laboratory.

Other speakers taking part in the two-day symposium included Dr. N. Paul Hudson, Dr. Edmund M. Spieker, Dr. R. P. Goldthwait, Dr. Howard Pincus, and Dr. Heiskanen from Ohio State University; Dr. Harold C. Urey, University of Chicago; Dr. J. Tuzo Wilson, University of Toronto, Canada; Dr. Perry Byerly, University of California; Dr. J. Lamar Worzel, Columbia University; and Dr. Naoiti Jumagai, Kyoto University, Japan.

The Institute of Geodesy, Photogrammetry and Cartography began its regular activities in the fall of 1952. Internationally known scientists engaged in various projects for the Mapping and Charting Research Laboratory have been serving as guest lecturers at the Institute.

During the fall quarter Dr. Meinesz gave a course on "Geodetic Applications of the Gravity Anomalies." Dr. R. Roelofs, Director of the Institute of Geodesy and Photogrammetry, Institute of Technology, Delft, Holland, also presented a series of lectures concerning the "Theory of Errors and Its Application to Photogrammetry." During the winter and spring quarters Dr. Kukkamaki is giving courses on "Geodetic Adjustment Computations" and "Map Projections." Dr. Bertil Hallert, Director of the Institute of Photogrammetry, Institute of Technology, Stockholm, is lecturing during the winter quarter on "Terrestrial Photogrammetry" and again in the spring quarter on "Special Problems of Photogrammetry."

Additional courses in photogrammetry and geodesy are also being given by Asst. Prof. F. J. Doyle and by Dr. Heiskanen, who is Director of the Institute.

Whose Description?

By IVAN A. PETERS

DIRECTOR OF BRANCH TITLE PROCESSING AND PLANT MAINTENANCE PLANNING, TITLE INSURANCE AND TRUST COMPANY, LOS ANGELES, CALIFORNIA

THE PURPOSE of this paper is to basically review or re-examine some of the pertinent legal and engineering rules which relate to the sufficiency, effect, and insurability of land descriptions contained in deeds or other instruments, affecting the title to land. The problems arising in this field, in the course of the business of a title insurer, are varied beyond imagination. They may arise in the presentment of documents in a current transaction where their effect is more easily controlled. Often, however, problems occur in the antecedent chain of title where no present control is possible. Yet, upon close scrutiny, understanding of the elements of the problem, application oi appropriate legal principles, and appraisement of risk, the title insurer can frequently hurdle what on the surface may have appeared to be insurmountable, without positive curative action. Such action might require considerable delay, great expense, and definite adverse customer relations, all of which are certainly to be avoided, if at all possible.

It is rare if a customer asks to have his title searched just to find out if it is currently insurable; thus, these problems almost always arise when time is of the essence, so to speak.

Plans have been made, refinancing is necessary, a new home being purchased, and the immediate sale of the old one necessary; funds must be raised to cover immediate hospitalization, etc. There may be any number of reasons why the sudden discovery that an exchange of deeds with unavailable or uncooperative neighbors, complicated and expensive surveys, or possibly court proceedings to quiet title or to establish boundary lines, is a serious setback to the customer. Not only is it a setback in his plans, but the reasons as to why this situation exists are difficult to explain, and if not properly explained to him he is completely confused and blocked in his dealings involving his land. That piece of land may go off the market and not yield what could normally be expected from it as an earning unit in the community and as such, an earning unit in the title business.

Full appreciation of these factors is not always considered by us in the title industry and all too frequently full analysis, understanding, and application of good description technique is not utilized. Too frequently insurance is refused or "ducked" by limitations and exceptions to the insurance given. Much of this arises by not squarely meeting these problems and there is a tendency to "pass ball" to the customer to correct his boundaries through the methods mentioned, in order to permit us to "bet on a cinch." Much too, is to be said on the point of whether we as title men reasonably comprehend the position of the private surveyors, the title engineers, the attorneys, and court decisions and statutes in respect to descriptions. Descriptions are something we work with every day in every title order we handle! We can't escape descriptions—and they do raise problems.

It is not possible to cover the entire field of descriptions in this paper, but there are some basic concepts which I believe are worthy of our reflection and consideration.

Descriptions for documentary purposes and for the purposes of record are invariably predicated on data derived from some previous survey.

A *survey* defined according to Webster is:

> To determine and delineate the form, extent, position, etc., of a tract of land, a coast, harbor, or the like, by taking lineal and angular measurements, and by applying the principles of geometry and trigonometry.

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Surveying (also defined in Webster) is the act or occupation of making surveys, or that branch of applied mathematics which teaches the art of determining the area of any portion of the earth's surface, the lengths and directions of the bounding lines, the contour of the surface, etc., *and of accurately delineating the whole on paper.*

The functional thing called a survey is the actual doing of the survey on the ground. This includes the finding and setting of monuments, the turning of angles, the taking of measurements, recording of vertical angles, making field notes, etc. The survey is not the map. The map is prepared later from the field notes and necessary mathematical calculations. It is not infrequent, even in the title business, that the misconception is indulged in that the map is the survey. Where, however, any inconsistency or error appears on the map of survey, the survey itself, not the map, will control.

Land surveying as presently practiced, as the definitions indicate, is the act of measuring distances or areas, and the running of lines of direction upon the surface of the earth. The results of these functions are marked to the eye by stakes or other monuments, or by correlating those functions to existing monuments either natural or artificial.

The surveyor has precision instruments to assist him with which most of us are familiar. These instruments include tapes, transits, spirit levels, spring balances, thermometers, plumb bobs, solar compasses, calculation tables of all sorts, and knowledge of his art. He must also have good legs and a strong back. Sometimes his most helpful instrument is an ordinary shovel with which a buried monument can be uncovered to justify or make certain his other observations, measurements, and the like.

Even if I were able, and I am not an engineer, time does not permit a detailed discussion of the method or technique employed by a surveyor under a given problem. Suffice to say that his is a precise occupation. It is commanded by the science of mathematics, aided by precision instruments, special training, and knowledge. His business is governed by license requirements, business ethics, and his constant awareness of his legal liability for negligent error or omission.

After conducting this precise function the map prepared from his survey will likewise be precise. A surveyor has no alternative except to "call them as he sees them." The *effect* of his survey is for others to determine, for he cannot depart from the application of the accepted and long-established rules of his profession.

A surveyor cannot, and dare not, in surveying land described in his client's deed, include any land that is not included; nor can he omit land which is included, however small or large. Some of the rules of surveying, however, recognize the extension of equitable principles of law, particularly in prorating excesses or shortages, but in the main, his is not a discretionary office—he must be precise. True, he may not agree with another surveyor as to the proper theory or approach to a given problem or the method of accepting or setting particular monuments, but in whatever he does he must be exact.

His is a precise business. We, who are not engineers or surveyors, often have difficulty in understanding the results of his work. Differences between his survey or a description prepared therefrom and what we as title men observe the title boundaries to be, or what they will become, are frequently noted. Often these differences are exaggerated or over-emphasized in the title business.

A surveyor cannot depart from *his* position, but we as title men may be able to help the situation by getting a clear picture in our minds of the surveyor's or engineer's objections or recommendations and how they relate to our title. Once we are able to accomplish that—and all too frequently it isn't easy—we then can go to the law for aid and assistance. Within our statutes and expressed in our cases much help is offered and certain discretions may be employed. Many problems which seem irreconcilable from a purely surveying point of view, without new deeds, boundary agreements, or court actions, can be solved or safely insured.

Much law on the subject of descriptions is in the books. It behooves us, as title insurers, to permit it to aid us in better serving our customers and conserving our energy and our time.

In order for us, as title men, to determine what prescription to take from the medicine chest of the law we must have a diagnosis of our ailment. We must be able to understand the problem posed by the surveyor or title engineer. Obviously, it is idle to use a gargle for a broken leg and stupid to put a splint on a sore throat. What is the ailment? How serious is it? Does it require hospitalization and surgery, or is it capable of home treatment? Perhaps it is only an imaginary ailment.

It appears that description problems are a common stumbling block of title examiners and searchers, partly because of an unwillingness to explore the intricacies of descriptions or possibly by being on unfamiliar ground with the surveyor or engineer. Examiners and searchers often throw up their hands and say, "Well Mr. Engineer, you say this description isn't correct, therefore, we *cannot* pass it," or to the customer they may say, "Our starter description doesn't say the same words as yours, therefore, *yours* is wrong."

Much of this is caused by failing to appreciate the basic fact that all that is legally necessary in the way of a description in a conveyance of an interest in real property is that the description that is used be sufficiently definite to identify the land to be conveyed, or that it furnish the means of identifying the land conveyed. (*McCollough* v. *Olds,* 108 Cal. 529; *Scott* v. *Woodworth,* 34 C.A. 400; *Estate of Wolf,* 128 C.A. 305.)

The fact that because descriptions in the same chain of title vary in mode of expression, or perhaps do not follow particular verbiage with which we are familiar, or which we prefer, does not discredit the description necessarily. The main thing to keep foremost in our minds is whether the description used is sufficiently definite on its face or aided by established rules of construction to identify the land under consideration.

At the expense of appearing pedantic, I would like to illustrate my point thus:

$$\begin{gathered} IV = 4 \\ 3+1=4 \\ 5-1=10-(3+3) \\ \sqrt{4}(3-1)^2-4=(10+20)^2-(56\times 4^2) \\ 2\times 4-4=900-896 \\ 4=4 \end{gathered}$$

It doesn't make any difference how we express the fact that 4= 4 as long as it is a fact. To a title man this should mean, is the description in the instrument under attack *sufficient* to describe the same land in my title? Or, expressed another way, can the land to be conveyed be safely identified within the legal requirement of a description of a conveyance?

There should be no mystery connected with this operation—with straight lots we have no trouble—part lots, generally no trouble—but when we get into conversion from area descriptions to measurements by distances things get fuzzy and metes and bounds and sectional land descriptions, with their many thorns, can only be the offspring of the devil.

Often we hear remarks from the surveyor or title engineer such as:

No closure by 0.7 east and west—O.K. north and south.

Damn thing is no good because I have to force a closure in the traverse.

That bearing is off 5 feet, and in 100 feet that amounts to 0.145 feet, and there is no tie to control it.

Wrong basis of bearings throws the whole thing out by six-tenths foot leaving a strip on the east and an overlap on the west.

These comments frequently leave the examiner and our customers in a sea of confusion and doubt. In spite of this, the examiner must not be too hasty in condemning a particular description even when disapproval of a title engineer has been indicated. Particularly included in the definite and serious duties of the examiner is the important one of getting the customer where he wants to go as quickly as possible within that margin of safety to the insuring company that is consonant with good business principles.

Before firing the executed paper back to

the customer with the terse comment that it must be redrawn and reexecuted to include the description set forth in the preliminary report—or that the company cannot insure title without the necessity of establishing a boundary of the land in question by means of a boundary line agreement, exchange of deeds, or quiet title suit, the examiner should review carefully the description as it bears to his title. He should consult with the surveyor or title engineer, or both, to determine exactly how serious this trouble or discrepancy is. In other words, diagnose the case. Find out where it hurts!

Much powerful medicine is contained in the laws of our State to aid us and safely carry us by many of the dangers pointed out by the surveyors and our title engineers. The fact that our title engineers and surveyors point out objections because they, in practicing their profession, do not have the latitude of discretion that our lawyers do, does not, in and of itself mean that there is no solution to the customer's problem.

Let us review very briefly some of our general rules in respect to descriptions.

Our simplest form of description is that which refers to a recorded subdivision map, that is, where an entire lot is being transferred. From the earliest times in California, as is generally the case in other States, sales or conveyances of parcels of land by reference to a map deposited with the county recorder have been recognized. The validity of such a conveyance, referring to a lot or parcel on such a map, depends upon whether the map can be produced and identified and whether, by applying the rules of surveying, a surveyor can locate the land from the description data given. Commencing in 1893, through many amendments, statutory regulations have been established to govern the method of filing such a map with the county recorder. These regulations are now codified, in the B. & P. C., sec. 11500 et seq., under the title of "Subdivision Map Act." Where persons owning a whole divide that lot, many problems can arise as we shall see.

Conveyances also can be made of lands by reference to Official Maps or Record of Survey Maps under certain conditions. Conveyances which refer to *unrecorded maps* are generally not regarded as sufficient to convey a marketable title; however, such instruments should not be disregarded by title examiners for in some cases such a map has been said to be sufficient, provided the map can be produced, properly identified, or otherwise established.

Land may be described in a conveyance by incorporating by reference another instrument which contains a sufficient description (*Central Pacific Railroad Co. of Cal.* v. *Beal,* 47 Cal. 151). Such an instrument can exclude as well as include land by such reference. Such a procedure requires that the instrument incorporated by reference be in existence, clearly identified, and, most important, that it set forth a correct and sufficient description.

Conveyances of land by instruments which contain blanket or general descriptions, e.g., "all land of grantor wherever the same may be situated" or "all lands belonging to the grantor in *X* county" are often sufficient but should be carefully scrutinized. Ambiguities may require explanation of the grantor's intent which, when considered, might limit the scope of the conveyance. (*Pettigrew* v. *Dobbelear,* 63 Cal. 396; *Brusseau* v. *Hill,* 201 Cal. 225; *G. R. Holcomb Estate Co.* v. *Burke* 4 Cal. (2d) 289.) Descriptions by name or house number have been held to be sufficient to convey title but the need for parol evidence to establish the actual boundaries of the land conveyed usually results in an unmarketable or an uninsurable title until the boundaries are definitely fixed. (*Stanley* v. *Green,* 12 Cal. 148; *Estate of Wolf,* 128 C. A. 305; *Von Rohr* v. *Neely,* 76 C.A. (2d) 713, 716.)

Under metes and bounds, that is, naming the land by measurements and boundaries, certain priorities of control are given to us in the rules which control the construction and interpretation of such descriptions.

The order of such priority is as follows:

(1) Natural monuments—rivers, trees, rocks, a ridge, etc.

(2) Artificial or man-made monuments—walls, fences, stakes, streets, etc.

(3) Lines
(4) Angles
(5) Surfaces.

The cases hold that where there is a conflict in the calls of a description between monuments and calls by lines, angles, and surfaces, the monuments control. (*Curtis* v. *Upton,* 175 Cal. 322.) The theory is that a person purchasing or selling land is more likely to make mistakes in respect to course (that is, bearing), distance, and quantity than in respect to permanent objects, which objects from being mentioned in the deed, are presumed to have been examined at the time. (*Colton* v. *Seavey,* 22 Cal. 496.)

The rule is also found in C.C.P., 2077, which sets forth rules of construction of the descriptive portions of a conveyance when construction is doubtful. In Section 2 it is stated, "when permanent and visible or ascertained boundaries or monuments are inconsistent with measurements, either of lines, angles, or surfaces, the boundaries or monuments are paramount."

There are qualifications to this rule, however, that:

(*a*) Monuments yield to other calls to effectuate the intention of the parties, and the rule is never followed where to do so would lead to an absurdity or where they are inconsistent with the manifest intent of the parties. (*Miller* v. *Grunsky,* 141 Cal. 441; *Powell* v. *Allen,* 155 Cal. 161.)

(*b*) Calls for monuments must refer to objects clearly and definitely established.

(*c*) Where it can be shown that the mistake is in the call for the monument and not in the other calls, the rule that monuments control is not always applied. (*Lillis* v. *Urrutia,* 9 Cal. App. 557.)

(*d*) Where boundaries are not certain, and the location of the monuments named is uncertain, or left in doubt, then the courses and distances, as shown by the field notes and maps of the original survey, will be considered as fixing the boundaries. (*Wise* v. *Burtan,* 73 Cal. 166.)

Within the limitations of the above qualifications, however, the rule is well established that *permanent objects as boundaries* or *natural boundaries* when set forth in a land description control courses, distances, and quantity, if they do not agree. (*Weaver* v. *Howatt,* 161 Cal. 77; *Hunt* v. *Barker,* 27 Cal. App. 776.) Such monuments control both courses and distances *if there is conflict* without regard to whether the monuments were seen by the parties to the deed or not. (*Anderson* v. *Richardson,* 92 Cal. 623.)

C.C.P. 2077, Subdivision 3, states:

> Between different measurements which are inconsistent with each other that of angles is paramount to surfaces and that of lines paramount to both.

Thus, lines control angles and angles control quantity. Where monuments are uncertain or in doubt, lost, or destroyed, the course and distance as shown by the field notes of the original survey will be considered as fixing the boundaries.

Generally a quantity expression in a description, e.g., containing 42.49 acres, is given no weight and not considered a part of the description. However, where the description of the land by monuments, distances, or otherwise is vague and indefinite by reason of conflicting lines or by the omission of a line, or from any other cause, then a statement of the quantity of the acreage often serves to determine the location of the boundaries. (*Hostetter* v. *Los Angeles T. Ry. Co.,* 108 Cal. 38.) Also, a quantity recital is given weight where not to do so would defeat the apparent intention of the parties.

Excess verbiage, false, vague, or indefinite statements or words are generally disregarded by the courts where the description can otherwise be made effective. Again the rule finds expression in 2077 C.C.P. where in Subdivision 1 of that section it is stated that:

> Where there are certain definite and ascertained particulars in the description, the addition of others which are indefinite, unknown, or false, *does not* frustrate the conveyance, but it is to be construed by the first-mentioned particulars.

and Subdivision 6 of said section states:

> When the description refers to a map, and that reference is inconsistent with other particulars, it controls them if it appears that the parties acted with reference to the map; otherwise the map is subordinate to other definite and ascertained particulars.

It is not an infrequent occurrence that the question arises where a wrong tract number or incorrect reference to the title of a named tract appears in a deed of record, but that the correct county and subdivision map reference is shown, e.g., Tract 6155 instead of 6165 which is correct, or Highland Park Subdivision No. 2 instead of Blanes Subdivision of Highland Park Subdivision No. 2. This discrepancy is not fatal, for under said Subdivisions 1 and 6 of section 2077 C.C.P. and cases applying those sections, such discrepancies can be passed.

In *Leonard* v. *Osburn,* 169 Cal. 157, it is stated:

> A deed is not void for uncertainty because of errors or inconsistency of some particulars of the description. Generally speaking, a deed will be sustained if it is possible from the whole description to ascertain and identify the land intended to be conveyed . . . nor will the deed be void for uncertainty from the fact that the description in part is false or incorrect, if there are sufficient particulars given to enable the premises intended to be conveyed to be identified.

Thus, if the correct map reference is included either by reference to the book and page of recording thereof or is sufficiently identified as to the surveyor's name and date of survey, and has been recorded, it appears under the cases that the correct map reference supplies the means of identifying the property conveyed and the inconsistent or false reference in the tract name or number is disregarded.

The principle announced in Subdivision 6 of 2077 C.C.P., to the effect that where the parties were dealing with respect to a particular map a discrepancy in a metes and bounds description which conflicted with the showing on the map must give way to the matters disclosed by the map, is upheld in *Wheatly* v. *San Pedro, L.A. & S.L. R.R. Co.,* 169 Cal. 502.

An interesting case involving errors in descriptions is found in *Duryea* v. *Boucher,* 67 Cal. 141. The description set forth was "The north ½ south ½ southwest ¼ southwest ¼ of section 13, etc., . . . being bounded on the south by the *Old Shaw Claim,* on the east by the *Clum Ranch,* on the north by the *Paul Claim,* and on the west by unoccupied lands."

The reference to the government subdivisions as shown would have located the land in the *southwest* ¼ of section 13 instead of *southeast* ¼ of said section 13. The court stated that "It makes no difference that the wrong legal subdivisions are inserted . . . these may be rejected as false where the remaining description sufficiently identifies the land." The court in this case applied the rules of adjoinders to establish and identify the ¼ section intended.

As soon as there is an adequate and sufficient description with convenient certainty of what is intended to pass by the particular instrument, an erroneous addition will not vitiate it. So much of the description as is false will be rejected and the instrument will take effect if a sufficient description remains to ascertain its application.

Much help is gained from the general rule, based upon C.C. 1069, that private grants are strictly construed against the grantor except as to any reservations contained therein which are interpreted in favor of grantors.

Other statutory aid can be found in Sections 1858, 1859, and 1860 C.C.P. wherein, briefly, in construction of instruments it appears that:

> (*a*) Where there are several provisions or particulars, a construction, if possible, is to be adopted as will give effect to all.
>
> (*b*) That the intention of the parties is to be presumed, if possible, and that a particular intent will govern a general one that is inconsistent with it.
>
> (*c*) That the circumstances under which the instrument was made, including the situation and circumstanecs of the subject of the instrument and of the parties to it, may be considered in interpreting the language of the instrument.

From all of this comes a cardinal rule of construction of the descriptive portions of the conveyance. It is to effectuate the intent of the parties if, by any possibility, that intent can be gathered from the instrument. (*County of Los Angeles* v. *Hannon,* 159 Cal. 37.)

It is the policy of the law not to defeat or frustrate but to sustain the instrument

if possible. In *Blume* v. *McGregor,* (1944) 64 C.A. (2d) 244, in construing a metes and bounds description in which five courses and distances were omitted, the description was read backwards from the point of beginning to determine the true intent of the parties. Also, in the last case, the general rule is set out that the sufficiency of the description will be sustained if a surveyor can take the deed and locate the land set forth therein on the ground *with or without the aid of extrinsic evidence.*

Bearing in mind these rules, and our general knowledge and experience as title men, let us look at some examples concerning descriptions and some of their tricks.

The simplicity of descriptions of a specific fractional part of a lot, such as the north 50 feet or north 10 acres, recommends and encourages their use, yet they are not always simple, and the problems arise from failure to understand the effect of such divisions when applied to lots of varying shapes. If a description, for example, calls for the east ½ of a certain lot, does this describe the east half by area or width, that is, a bisection of the north and south lines? There is no question when the lines of the lot all correspond to the cardinal points of the compass. For example (fig. 1), in *Wood* v. *Mandrilla,* 167 Cal. 607, the following situation was presented:

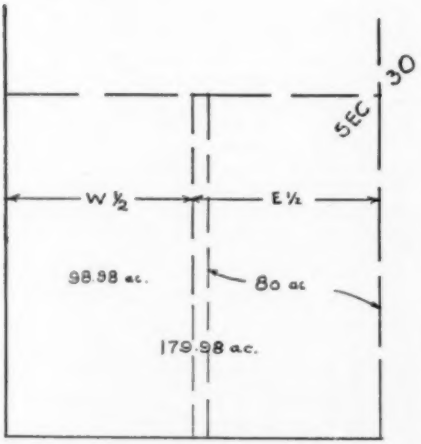

FIGURE 1

W acquired title to all of the southwest ¼ of section 30, etc. Included in the southwest ¼ were 178.98 acres. *W* later sold to *M* "The east ½ of the southwest ¼ of section 30, township 20 south, range 24 east, M.D.M." No acreage was mentioned. *M* took possession of approximately 90 acres or half of the total of 179.98 acres in the southwest ¼. On the original township plat a north and south line was shown and the acreage noted as 80 acres. *W* contended that, because of the 80-acre line being shown on the township plat *as a government subdivision* of the east ½, 80 acres were conveyed by the deed.

It was held that the word "half" has a plain, common, and natural meaning, and when used in describing lands is to be understood literally. If used without qualification it must be given its literal meaning of two equal parts. *M* is entitled to one-half of the total acreage. The same applies to other fractions as ⅓,¼, and the like.

Conflict enters the picture, however, where, in the division of a lot by area, certain lines of the lot do not agree as to length, for example (fig. 2):

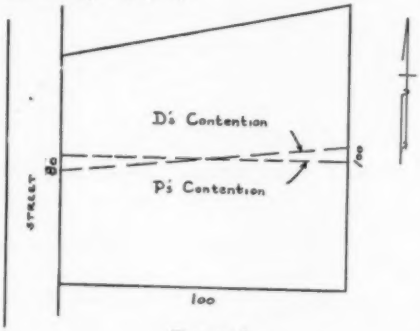

FIGURE 2

By deeds from *A*, the owner of the whole lot, both given at the same time, one describing "the north ½" and the other "the south ½," conflict arose as to how to divide the lot. *P* contends for the area bounded by a straight line drawn east and west sufficiently north of the south line to embrace one-half the lot area. *D* contends that the east and west lines should be bisected. In either event the area is equally divided, but the frontage is affected. *P*'s contention would give him 45 feet and *D* 35 feet frontage. *D*'s contention would give them equal frontage but the dividing line would not be at right angles to the street line.

In *Lavis* v. *Wilcos,* 116 Minn. 187, *P*'s position was upheld.

If writing a *record policy only,* a title company could insure both descriptions, but any conversion into metes and bounds or lineal measurements would have to be carefully considered. In A.T.A. and Extended Coverage such half descriptions might be insured if the parties had placed a practical construction on a division by clear or long-acquiesced-in possession lines comformable with the probable title lines.

If it can be determined that a line was established and marked on the ground along the probable title line at the time of the split, the courts would view the term half, as used, in the light of such showing *as surrounding facts and circumstances* indicate the intent of the parties.

Another variation of this same type of division is illustrated by the following example (fig. 3):

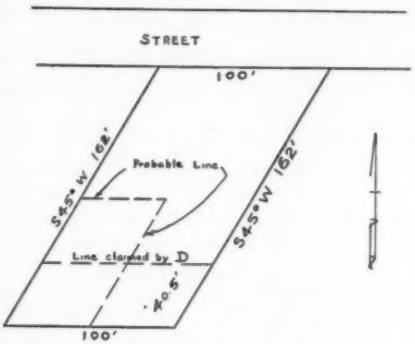

FIGURE 3

A lot is 100 feet by 162 feet in the form of a parallelogram, and a division is made of the lot as "the southwesterly ½ of lot *so-and-so.*" An action develops and it is claimed by *D* that the southwest ½ of the lot is ½ of the area of the lot, being the rear 40.5 feet thereof and extending across the entire width of the lot. *P* claims that it is the southwest ½ determined in the same manner as sectional lands are subdivided by dividing the area into halves by running lines equidistant from the boundary lines both north, south, east, and west.

Such a contention would result in that area covered by the probable title line in figure 3. In a Standard Form policy the southwest ¼ of the lot could be insured, assuming other factors as sufficient, because the insured does have title to that portion of the lot wherever it is determined to be. But, in Extended Coverage and A.T.A. work, facts which the survey and possession show may conflict seriously with any fixed supposition as to what was intended.

Specific quantity descriptions, e.g., "east 20 acres" or "east 50 feet" of a lot present problems where a government subdivision or a lot on a recorded map are not regular in form.

In a description calling for the east 20 acres, for example, the general rule is that the specified number of acres will be set off in *parallelogram* form on the appropriate side, (*Woods* v. *Selby Oil and Gas Co.,* 2 S.W. (2d) 895; affirmed 12 S.W. (2d) 994; 26 C.J.S., page 385). In other words, a line parallel to the called line is laid off a sufficient distance from the line to embrace the number of acres called for. Also, in a description calling for "the southwest 10 acres" or "10 acres in the southwest corner," the areas are usually square in form or within lines parallel to the south and west lines of the subdivision of which it is a part, (*Harper* v. *Hesterlee,* 109 S.E. 902). These rules yield, however, to the intent of the parties if expressed, or are presumed from surrounding facts and circumstances where the tract being divided is irregular. For instance, in figure 4, a lot has a total area of 155 acres; portions are deeded out as "the north 80 acres" to *D* and "the south 75 acres" to *P*. It was held in one eastern case that such a division should be made by enclosing 80 acres of land by a line parallel to the northeasterly line, following the above rule of parallelograms, but that the south 75 acres could not be divided according to that rule for it would lead to an absurdity by causing an overlap at (1) and leaving an area back in the grantor at (2). The grantor had conveyed everything he owned and did not intend to retain anything.

A surveyor and a title engineer would probably call these inadequate and uninsurable descriptions by reason of not being able to ascertain what the true boundaries were;

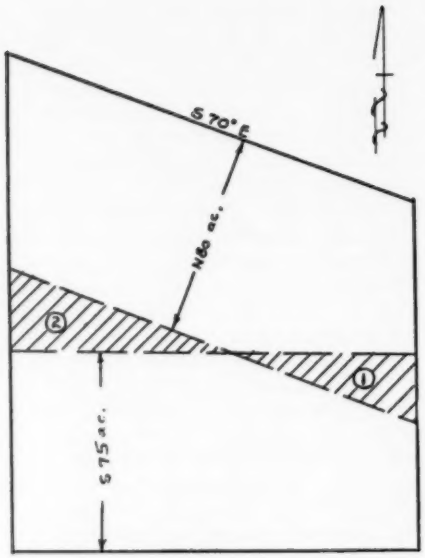

FIGURE 4

however, again in Standard Policy work such descriptions could be insured. No description based on any *specific dividing line* could be insured, however, without a boundary adjustment by the owners. Conflicts in such situations could be avoided if the cuts were occurring in a current order by drafting descriptions which would define the south line of the north 80 acres as parallel to the north line, etc., and the remainder as "all of the lot, etc., except the north 80 acres, the south line of said 80 acres being parallel to the north line," etc.

One of the most common forms of description in California is the division of a lot on a recorded subdivision by the north, south, east, or west so many feet. Although there appear to be no decisions interpreting the method of laying off such a division, most engineers assert, and it has become so widely used and accepted as to amount to a trade custom, that such a division is laid off as illustrated in figure 5. A division of the north 50 feet and the south 50 feet of a lot is made by constructing a line parallel to the called directional line, north line and south line in this case, at the distance prescribed, which distance is measured at right angles to such directional line. No problems present themselves if the lines of the lot are at right angles to each other and the actual amount of footage exists in the lot.

When any of the lot lines are not at right angles, difficulties are presented. The technical rules of platting and construing such descriptions must be observed and considered in title work. It is also very essential to bear in mind *intention,* and the control of surrounding facts and circumstances as indicative of intent at the time of the division of a lot by such descriptions. Persons in their ordinary dealing with real property do not always view their ownerships and conduct themselves according to the technical rules, and very frequently it is shown that they have placed a practical construction on their choice of language which can, in many cases, be safely accepted by a title company. Such matters can very often be easily ascertained by making a ground examination.

An actual case involving a very similar situation was considered by our office within the past few weeks.

You will observe, in figure 6, that the east and west lines of lot 1 and the north line are at a considerable angle to one another. Descriptions were included in conveyances filed for record as "the north 50 feet," "the south 50 of the north 100," "south 100 of the north 200," and "the south 50 of the north 150 feet," etc. These conveyances have been on record for some time and in-

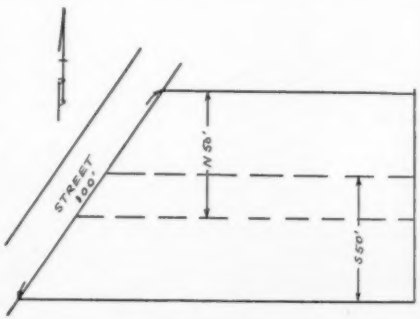

FIGURE 5

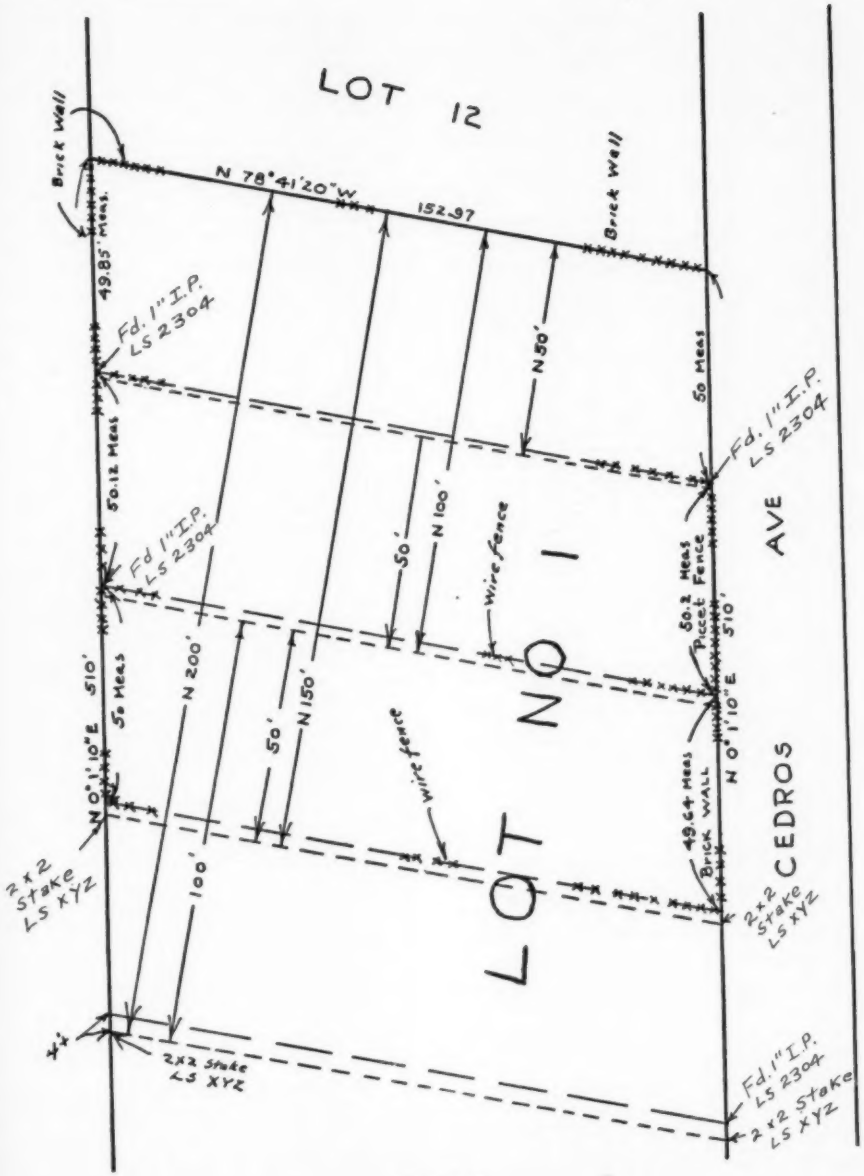
LOT 12
Brick Wall
N 78°41'20"W
152.97
Brick Wall
49.85' Meas.
Fd. 1" I.P. LS 2304
50.12 Meas
N 50'
50 Meas
Fd. 1" I.P. LS 2304
Fd 1" I.P. LS 2304
50'
N 100'
Wire Fence
50.2 Meas
Picket Fence
510'
N 0°1'10"E
50 Meas
N 200'
50'
N 150'
Wire Fence
N 0°1'10"E
49.64 Meas
Brick WALL
LOT 1
CEDROS AVE
2x2 Stake LS XYZ
100'
2x2 Stake LS XYZ
2x2 Stake LS XYZ
Fd. 1" I.P. LS 2304
2x2 Stake LS XYZ

FIGURE 6

sured according to the above descriptions. The owner of the lower parcel hired a surveyor to stake his parcel and the surveyor, whom we will call *XYZ*, staked the parcel according to the technical rule of constructing perpendiculars to the north line, calculating the distances down the east and west lines, and placing stakes, as noted. Closer scrutiny by the surveyor would have shown that a practical construction of what was meant by "the north 50 feet" and "the south 50 of the north 100 feet," etc., had been made by the owner who originally sold, and by his grantees.

Actually the old owner had had a survey made originally to establish these 50-foot parcels as measured along the east and west lines. This is borne out by the finding of iron pipes set at the corners of the 50-foot parcels measuring along the east and west lines of lot 1. These are the monuments set by LS 2304, as shown.

In addition to the existence of monuments set on the ground at the time of division, which monuments alone could control a conflict of this sort, the parties who purchased went into possession on such a theory and have established fences and walls closely conformable with the monuments. This fact was not considered at all by Surveyor *XYZ* who applied only the engineering approach. The distances shown as measured on the sketch are not measurements by a surveyor but were made with a tape by our office personnel and no refinements were used such as temperature adjustments and the usual levels, etc. The walls and fences indicate a very close adoption by the owners themselves of an interpretation of the descriptions in their conveyances as measured along the east and west lines of lot 1. Is it possible to now write on a parcel as "the southerly 50 of the north 150 feet of lot 1, etc., measured along the easterly line of said lot 1?" It is my opinion in view of these disclosures, which were simply and easily gathered, that it is safe to do so.

Some very distressing problems arise under divisions of lots where the lots are shown on the subdivision map with distances of the lot lines extending to the centers of streets and the map bears a legend "areas and distances computed to street centers" or other similar language.

The ordinary situation is where lots are shown on a subdivision map and where no legend appears. But where some of the measurements and some of the lines of the lots extend to the center of adjacent streets, and in some cases the acreage showings for the lots on said maps can only be arrived at by including the area in the street adjoining, the question arises as to what constitutes the lot (fig. 7). The rule is clearly established in California (*Earl* v. *Dutour*, 181 Cal. 58; *Peake* v. *Azusa Valley Savings Bank*, 37 C.A. (2d) 296), that in fractional divisions of such lots, whether by area or measure-

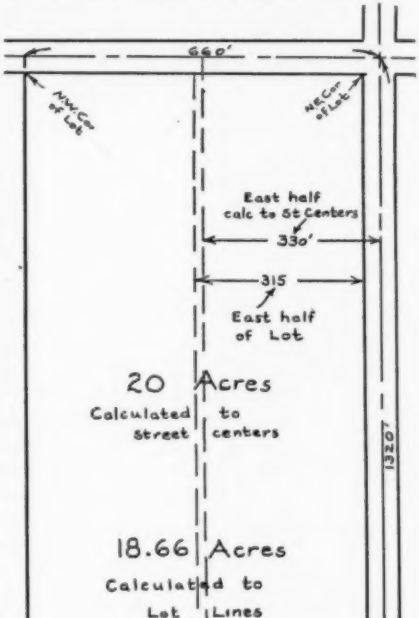

FIGURE 7

ment, the lot is considered net of the area occupied by the street even though the owner, at the time of the division, owns the area in the street subject to the public easement. The courts view the terms "lot" or "block" in their ordinary meanings of that part of the lot or block set apart to private use and occupation and not in the technical sense of including the street area. This is a presumption of the intent of the grantor and in the absence of any clearly conflicting circumstances in the deed or on the map referred to in the deed the divisions in such cases will be considered net.

This presumption may be rebutted by a statement on the map or matters shown in the deed. When doubt is raised as to the meaning of the term "lot" or "block," and what the grantor intended, parol evidence may be introduced to explain the intent and clarify the instrument's meaning. Such matters include the common custom in the community as to the meaning of the term "lot" or "block" as used in relation to such tract map and in conveyances by the subdivider. How the land has been assessed may be taken into consideration.

Ground examination, including measurements, location of possession lines, can be indicative of the interpretation of what the meaning of statements on the map as to distances and areas measured to street centers actually have meant to the people affected. Evidence of such a nature is not considered for the purpose of changing the written instrument but for the purpose of explaining the language contained therein. (*Ferris* v. *Emmons,* 214 Cal. 501.)

Thus, in this example (fig. 7), in the absence of any qualification on the map or in the deed, such a lot would be considered net of the street as to east ½ and west ½ divisions. But, if a legend appeared on the map or the language of the deed indicated otherwise, the local situation and how the people treated such a situation in their dealings with the land would have to be considered. Both possibilities, net and gross, would have to be looked at, the assessor's attitude and the ground situation inquired into, before definitely taking a position as to a specific portion to be insured.

The meanings of the terms *north, south, east,* and *west,* or *northerly, southerly,* etc., are held in the absence of any additional controlling language to mean the cardinal points of the compass—true compass points, not magnetic bearings. In other words, in the absence of ties to some known monument or a phrase like "northerly parallel to the river," the term *north* or *northerly* will be construed as north on a meridian of longitude, or north on a straight line connecting the point of commencement of the line with the north pole. *East and west* standing alone as a directional bearing means at right angles to the meridian at the point of commencement of the course. Such a course would be a parallel of latitude. In the illustration given in figure 8, section 31 was surveyed and shown on the original township plat as a regular section. The actual northwest corner of the section was monumented on the ground at the time of survey some distance south of the position for the northwest corner as shown on the plat. Section 30 adjoining on the north, of course, was governed as to its south line by the monumenting of the northwest corner of section 31. *A,* owning land in both sections 30 and 31, made various conveyances of portions of his land using in his deeds de-

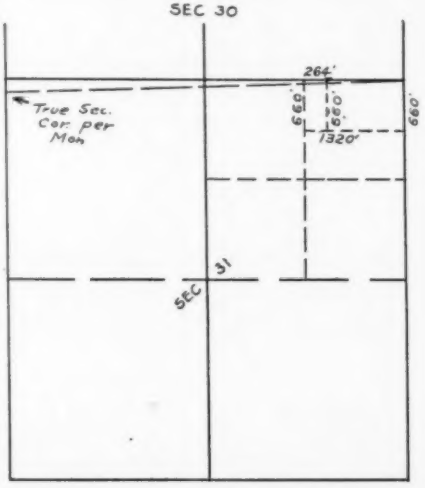

FIGURE 8

scriptions which followed a pattern of subdivision; a typical description described "certain land in Los Angeles County (etc.), described as: Beginning at the northeast corner of section 31 (identifying it by township and range); thence south 660 feet; thence west 1056 feet to the true point of beginning; thence west 264 feet; thence north 660 feet; thence east 264 feet; thence south 660 feet to the true point of beginning." No ties, bearings, or qualifications as to "that portion of section 31, etc., included within the following described land" were used. In the absence of any qualifying controls of the courses and distances, the effect of the description is to convey a portion of section 31 and also grantor's interest in that portion of section 30 included therein.

This same type of call, of "north" or "due north" without tie or bearing, points up another very subtle situation which can prove very embarrassing (fig. 9).

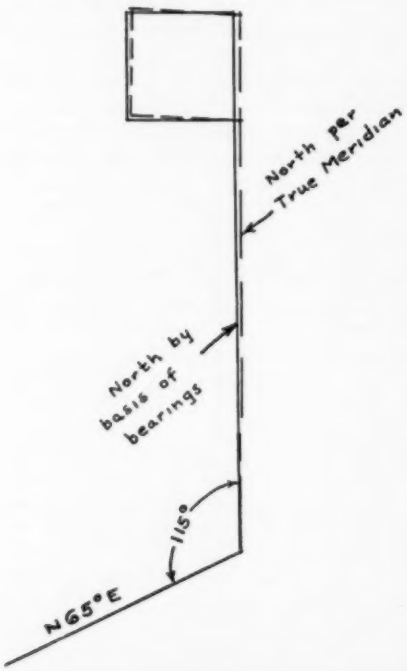

FIGURE 9

In a well known oil producing area in the State, a metes and bounds description was used in an oil lease which commenced at a point on the boundary of a certain ranch, as established by a particular survey, and then proceeded along the ranch boundary line on a named bearing, shown in this illustration as *north 65° east* so many feet to a point; "thence due north 13,955.04 feet to the true point of beginning; thence due west 660 feet; thence due north 660 feet; thence due east 660 feet; thence due south 660 feet to the true point of beginning." A dispute arose as to the meaning of "due north" as used in that description. In a recent appellate court decision the finding of the lower court was sustained that the term "due north" means along the true meridian and not along a line which would be established as north 0° on the basis of the bearings of the ranch survey. A sharp difference of opinion among leading engineers and surveyors testifying as to the true meaning of the terms "north" and "due north" as used in the description and method of surveying the land covered by the lease is noted in the case. The difference in the two locations of the north course resulted in approximately 12 feet and involved whether a high producing well invaded plaintiff's land. The matter is going up before the Supreme Court now, but unless a reversal is granted on this point "due north" means north according to the true meridian. This illustrates that if it is meant that a basis of bearings is to be used, all angles turned should be in relation to that basis of bearings and not left to speculation and conjecture as to the actual intended direction.

Frequently, the question of apportionment of excess or deficiency is presented in surveys for A.T.A. and Extended Coverage work or by Licensed Surveyor Maps filed for record.

The general rule is that any excess or deficiency is to be apportioned among the several lots in proportion to their respective platted widths, (*Booth* v. *Clark,* 59 Wash. 229; *Eshleman* v. *Walter,* 101 Cal. 233, applies this rule of apportionment to a government survey section; *Brumley* v. *Hall,* April 1952, 110 A.C.A. 846).

Figure 10 illustrates facts which are reported in a recent appellate case (*Brumley* v. *Hall*, April 1952, 110 A.C.A. 846). The lower court threw all of a deficiency of 19.65 feet into lots 31 and 32, being the lots owned by the parties to the action. No part of the deficiency was assigned to lot 30. On the appeal the lower court was reversed and the deficiency was apportioned between the three lots equally.

This general rule of apportionment is subject to many qualifications and care should be exercised in applying the general rule without careful consideration. Among the qualifications are noted the following:

(1) If all lots on a subdivision are given dimensions except one, it has been held that the subdivider intended that the undimensioned lot take the excess or deficiency. This is sometimes called the "Remnant Rule."

(2) Where improvements have been constructed on the original lot lines, or the lots staked or otherwise monumented, the monuments may be controlling (*Andrews* v. *Wheeler*, 10 C.A. 614).

(3) If the lines as originally surveyed can be retraced and the error accounted for as not

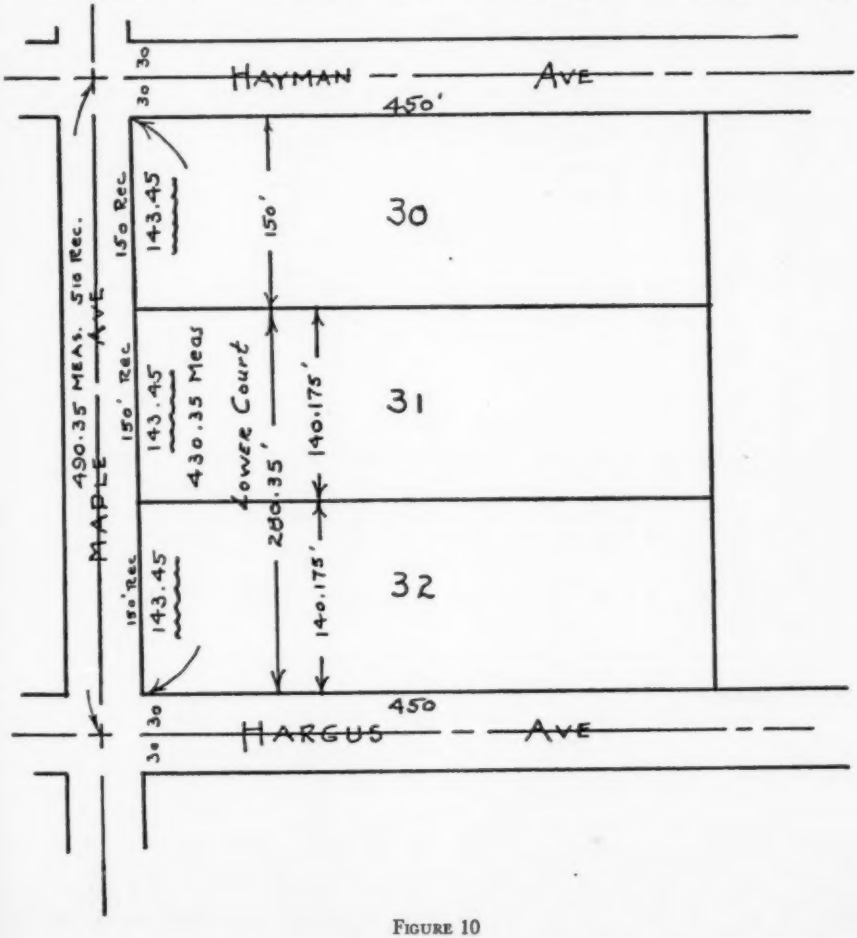

FIGURE 10

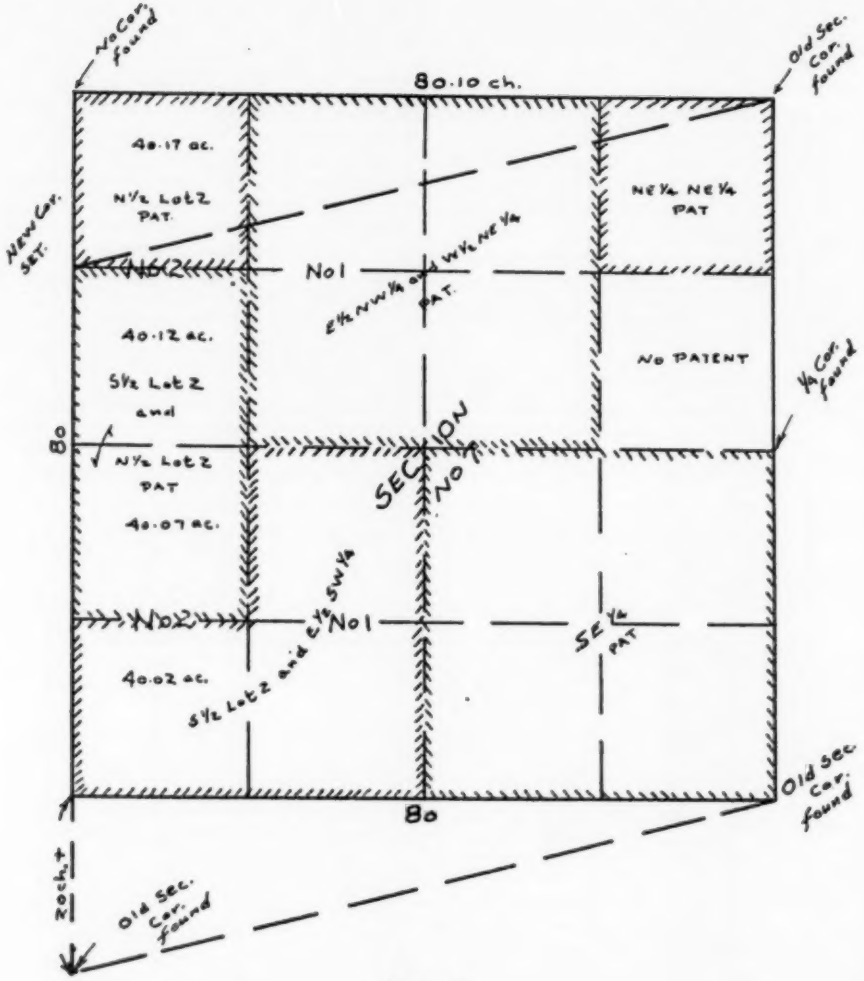

FIGURE 11

resulting from imperfect measurement but from some other reason which would place the excess or shortage in a particular lot, the general rule is not followed.

(4) If adverse possession has been established for the statutory period along the original lot lines, or boundaries are established by sufficient agreement or acquiescence along the original lot lines, the general rule is not followed (Skelton, *Boundaries and Adjacent Properties,* Chapter III).

Recently our Company has been devoting considerable time and study to problems presented in questions arising out of titles to lands formerly public lands—in particular, the circumstances surrounding the surveys upon which the original township plats were based and the disclosures of subsequently made dependent and independent resurveys. Much effort is being put forth to be sure that the plant facilities in our offices,

particularly in our branches, contain not only the original township plats but all other township plats since made, based upon either the dependent or independent surveys. In many cases our tract books and usual plant procedure must be supplemented to protect against the snarls developed by this inquiry. Time does not permit any detailed discussion along this line, nor is our inquiry complete; however, it may be well to show an example of one circumstance that has been uncovered.

Figure 11 shows the original survey of section 7 to be a fairly regular section containing 640.38 acres. All of this section was patented in the manner shown by the crosshatching, except the southeast ¼ of the northeast ¼. The dashed lines show in effect the approximate shape if the monuments set for the section corners were followed. Actually the old southwest corner monument is not as it is indicated on this sketch but about 38 chains west and 20 chains south of the corner shown on the original plat. As the monuments set for the section control its size and shape, strange things occur when attempt is made to reconcile the descriptions of the patents, all of which were issued sometime prior to 1922. In 1922 this section was resurveyed and the present section 7 which previously was shown as regular now appears as in figure 12.

You will notice that it is now 118 chains on the north line, and the south line is a little peculiar. What have they done with the originally patented land? That is shown by tracts on this survey, as is customary, but notice their location—crosshatching is what the new survey shows for those patents. Notice all the nice new land represented by the areas with lot numbers shown. Lots 3, 8, 11, 12, 14, and the 40-acre piece down at the bottom once were in the old section and had been patented. Not content with putting a section stretcher on this section, the

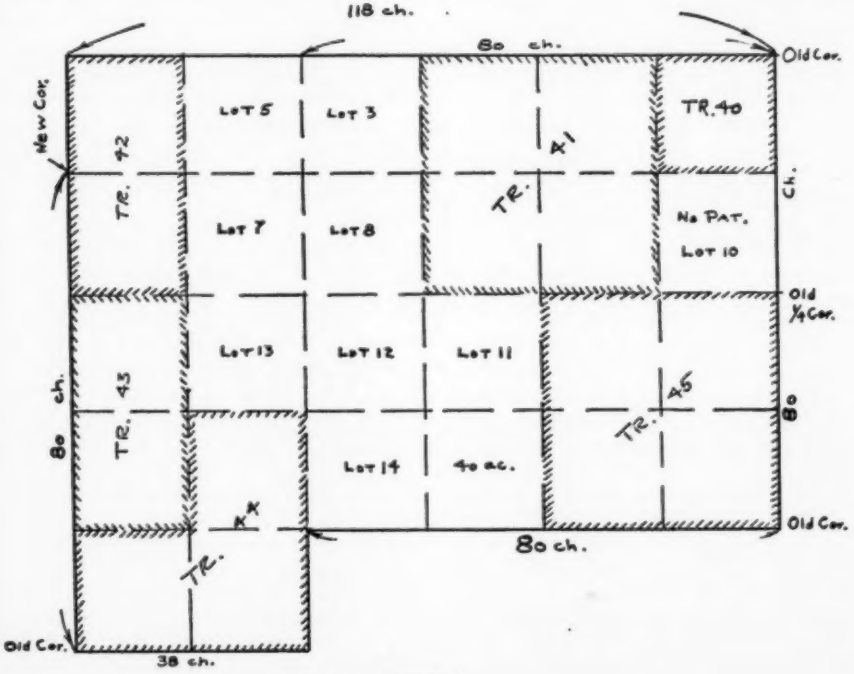

FIGURE 12

government has issued patents to all of these nice new lots except the part shown as lot 10 which no one seems to want either under the old look or the new look.

Have we issued?—fortunately no—what's the answer?—we don't know yet but the case is particularly illustrative of what may occur on resurvey as we attempt to retrace the old surveys and apply the data shown by subsequent surveys.

In the foregoing I've laid a bit of stress on many factors which can be utilized in favorably viewing description problems. Ours is a changing business, a growing business, and as the years go along new rules of practice are developed to meet the demands and needs of our customers. Many of the reasons used today to support the undertaking of risks would not have been considered 15 or 20 years ago as valid or persuasive .

Experience and more inquiry into the intricacies of our business have taught us new methods and have urged us to explore deeper into those phases of our laws, our experience, and the facilities at our disposal which will aid and furnish solutions to the problems raised in our business. Many solutions to problems that might otherwise require much delay, expense, and ill-will, are arrived at by our lawyers, our title committee, and our management in their desire to keep in a healthy condition our customer relations. Insurance can often be given by the undertaking of risks after appraisement of a complete analysis of the problem and the presentment of all facts which bear on the problem both record and off-record.

Applying the essence of this approach, much reliance is placed on the cardinal rule of construction of a conveyance *to effectuate the intent of the parties,* if by any possibility that intent can be gathered from the language employed. This is an easy phrase to use and, as stated by the court in a leading case (*Walsh* v. *Hill,* 38 Cal. 481), "the only rule of much value . . . one which is frequently shadowed forth, but seldom, if ever, expressly stated in the books . . . it is to place ourselves as nearly as possible in the seats which were occupied by the parties at the time the instrument was executed; then, taking it by its four corners, read it."

It must be remembered, however, that the intention must be expressed in the conveyance, not merely surmised. If the writing does not furnish the *means* whereby the description may be made sufficiently definite and certain, then the instrument must be held void, (*Saterstrom* v. *Glick Bros. Sash etc. Co.,* 118 C.A. 379). A deed which failed to describe land so that it could be located, and furnished no means by which its description could be made more definite was held void in *Smith* v. *California Portland Cement Co.,* 134 C.A. 630.

Extrinsic facts and circumstances as aids can be considered to explain an uncertain phrase, or term, or ambiguities, (*Reamer* v. *Nesmith,* 34 Cal. 624; *County of Los Angeles* v. *Hannon,* 159 Cal. 37; *Warden* v. *Brandes,* 103 C.A. 744). Such extrinsic matter or parol evidence cannot be used where (*a*) it would add to or vary a description which is otherwise definite and certain or (*b*) to explain an ambiguity on the face of the instrument (*Brandon* v. *Leddy,* 67 Cal. 43), as where the deed shows there are two lots to which the description equally applies. In such case the deed is void. Resort must be made to the common methods of adjusting boundary lines where it is not possible to apply within safe limits the rules of construction or where the factor of unmarketability is determined to be seriously affected.

Adjustments are usually made by exchange of deeds, by court proceedings, or agreement. However, it is possible that boundaries may have in fact been adjusted by the acts of the parties and not reflected on the record. This would include adverse possession, estoppel, or agreement and acquiescence. Detailed discussion of these factors is not possible at this time but a comment or two on establishment of boundaries by agreement should be made.

Uncertainty of the boundary line is essential for the basis of an effective agreement. The reason is obvious because, if the true boundary line is known, an agreement that it be established in another position would not operate to transfer the titles of the agreeing parties up to the new or agreed line. That could be accomplished only by a con-

veyance or other recognized method of transfer. It is not required that the true boundary be impossible of location but only that the parties believe that uncertainty exists.

As to an oral agreement establishing a disputed boundary, it is essential that the parties acquiesce in the location of such agreed line by possession up to the line for the statutory period to bar an action for recovery of the land up to the old line. Two fine articles on boundary changes by agreement and acquiescence can be found in *14 California Law Review 138;* and *14 Southern California Law Review 460.*

Much consideration must be given to the factor of unmarketability of title by reason of variations of the record title description, and the description which is to be sustained must be supported by extrinsic facts, construction of intent, etc.

Management and title committees will weigh this in their appraisement of risk and, if they feel that customer relations and facility of operation is better served by solving the problem of the customer by using the rules of construction, etc., the objection of unmarketability in many cases can be subordinated in the interests of good service and cooperative relations with our buying public. (Insurance of Marketability of Titles, panel discussion, *1950 C.L.T.A. Convention Proceedings,* page 87.)

Whose description? It doesn't make any difference whose, if it is a description that permits insurance to be given within reasonably safe bounds and the customer's deal to be carried out.

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From the Diary of an Old-Timer

By M. G. McMILLAN

REGISTERED LAND SURVEYOR, STARKE, FLA.

This excerpt was taken from one of the diaries of the late H. E. Lagergren, my grandfather, who practiced land surveying in and around Bradford County, Fla., from 1890 until June of 1938, the time of his passing.

Needless to say, I am extremely proud of these diaries, and consider them, without reservation, my most valuable possession, as they present a very clear picture of 48 years of survey records in my home county of Bradford, where I now maintain an office.

The excerpt which follows is entitled "In the Field" and relates an experience that happened in the year 1908. You will notice that in this entry the surveyor gives a vivid description of his followers. I am sure some of the "Old Timers" in the surveying profession will remember when they too have had a large following of interested spectators who expressed willingness to "pull the chain," "tote the axe," and get in the way in general.

In the Field

I HAD received a letter from the owner of a quarter-section of land to come and survey it. It ended with the request, "Bring your transom." I wondered what he could mean by that, then concluded that he meant my transit, and understood that a more than ordinarily particular survey was required.

The section in which the work was to be done was in a township originally sectionized in 1831, but resurveyed by Randolph in 1853. I had the field notes for the township and platted that section, afterward comparing the plate with the same section on the township plat.

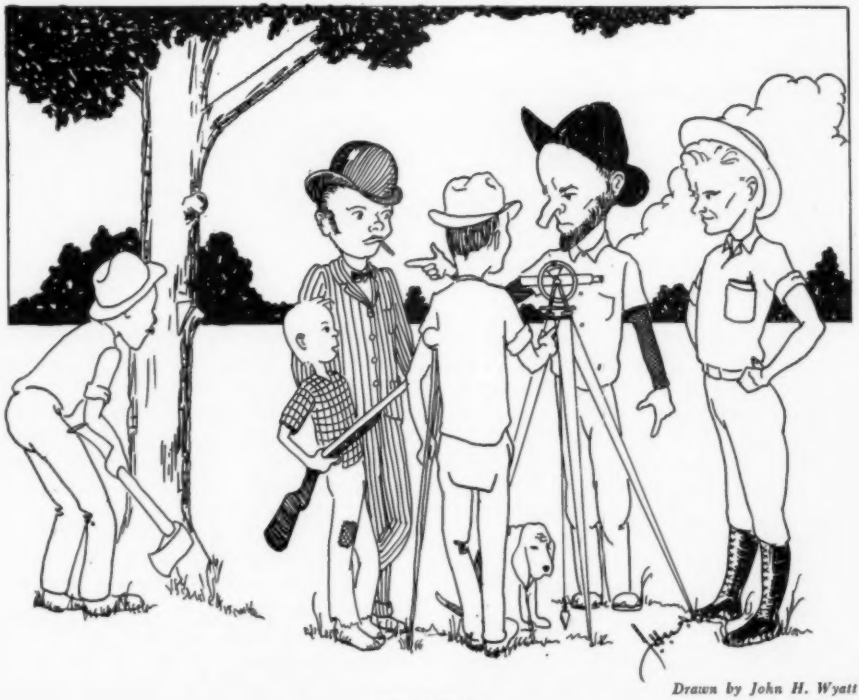
When we started out a big crowd was along, for this was an important survey to settle finally an endless dispute about lines. I understood that old man Hunter, old man Upchurch, old man Edwards, old man Richard, old man Lake, old man Kelly, and other old men besides, had had their whack at the section—for I never yet heard of a young surveyor, no more than I have heard of a small rattlesnake. Surveyors and rattlers seem to stay in their dens till they get old and vicious. The crowd looked daggers at me, as they always do at a surveyor when he begins his work. His employer hates him on account of the expense, the other parties concerned in the survey hate him because they think he is going to favor his employer in locating the lines, and the camp followers hate him because he gets 5 dollars per day while they have to work for 50 cents and two meals. I looked around to see if the "regulars" were all there. Yes. The boy with single-barreled shotgun was present. He insists on standing close to the instrument with his iron. The two dogs that always settle their disputes under the instrument were along. The "man with convictions" was there. He is an old man of studious aspect and with a mien that seems to say, "I don't care how you run your lines; I know the lines and corners." As the women have their favorite doctors and preachers whom they worship, so these old men have their favorite surveyors, and the lines run by them they know are right, no matter how wrong they may be. The "investigator" had also put in an appearance. He is a middle-aged man with an axe, and goes alongside the lines and chops into every tree that has a blaze, a chop, or a "bump." Then there was the man with the sore leg, who follows the sur-

Presented at the Annual Meeting of the Florida Engineering Society, Tampa, Fla., April 21–23, 1949.

veyor and tells him of his misery and shows his ulcers to anyone he can corner. Last, but not least, was "Smart Aleck." He goes to Jacksonville occasionally and gapes along the streets, gets drunk, and gets fined. At home he tries to pose as a man of the world and shows a lot of obscene pictures and cards he has begged from the saloonkeepers.

I was told that the northeast corner of the section was standing and undisputed and asked to be taken there. "Smart Aleck" had a conference in a low voice with some of the crowd and they then went ahead to the corner. I easily recognized it to be a quarter-section post, although "Smart Aleck" averred it was the northeast corner of the section. Looking at my plat and finding that the quarterpost on the east line stood on the north edge of a cypress pond, as this post did, I set my transit over it and ascertained by the witness trees that it was correct, then pointed north, sent the flagman ahead and started the survey from that stake. The crowd had wanted to see if I understood my business and had expected me to go west or south, and the smart one felt dismayed at my failure to do so.

After going north half a mile we came to the section corner, which was correct. I then went west. Whenever I set up I told the chainman to keep the chain and pins away (from the attraction of the needle). I dared not tell the reason why, as they then, in my absence, would stick pocket knives to the needle to see it move and thus rob it of magnetism, and I overheard them remark that I was a "cranky old cuss." Going west the first half mile called for 41.11 chains, but before I had made 40 chains, the owner of the northwest quarter of the section (my employer owned the northeast quarter) showed me a post that old man So-and-So had set, and which was



Drawn by John H. Wyatt

THE CROWD

right. This was an irregularly shaped section and I had found from retracing Randolph's lines during many years that such sections were always true to field notes. I went on until I had reached 41.11 chains, and I set a temporary stake, not finding any quarter post there. I then went about 37.50 chains further west to a post which all, except my employer, declared was the northwest corner of the section. It did not agree with a single witness tree, but from it started a line bearing south 8 degrees west, plain enough, but apparently not made by Randolph. As I had to measure all the boundaries of the section anyway, I let the matter rest for the present and went back to the starting point, the quarter post on the east line.

From here I went south. "Smart Aleck" had come in a new suit of clothes with creased trousers that had cost his father two cows to buy, and 5-dollar "chickenskin" shoes. He had hitherto been able to take reasonable care of his shoes, but now we had to cross a pond that is very long east and west, and being full of "wit" which must be unloaded at any price, he could not afford to leave the crowd while he went around the pond, so he crossed it by jumping from one stump to the other and walking the logs. The water was very high and cold and after we left the pond we had to cross a flat covered with several inches of water. Through it ran a deep ditch, not easy to see. The chairman pointed out the ditch to me and after I had crossed it said, "Look out for fun." Now comes "Smart Aleck," holding up his trousers, and skipping through the water on his tiptoes. He does not see the ditch and falls into it "kerplunk." His derby hat floats away into the pond and he rises up as wet and limp as a dishrag. His fine suit is ruined, his cards and verses ditto, and his pistol lies at the bottom of the ditch, full of sand. He casts a reproachful look at us, then goes to capture his hat—and then home, followed by the laughter of the crowd.

I found the southeast corner standing and true and from there pointed the telescope south 85 degrees west. The "investigator" had not hitherto been able to score a point, although he had been chopping into numerous trees on both sides of the line, to the confusion of future surveyors. But his hour of triumph had come. The boy with the gun, anxious to be of service somewhere, looked out for blazes, and bumpy trees and directed the investigator's attention to them. About 100 yards southeast of the corner the boy pointed out a bump on a tree and the investigator chopped it out. Lo and behold! There were the letters "Sec," "Tp," and "R," and obliterated Roman figures plainly revealed. I was called thither and asked what I had to say for myself. There was the corner of the section, as anyone could see. But I didn't collapse. The marks were about 5 inches under the bark, which indicated that they must have been made by the first sectionizer, nearly 80 years ago. Randolph's resurvey, which alone was valid, was made only 55 years before and his marks, three chops, were still visible. I was seconded by the men who lived in the adjoining sections east and south, who did not want any land taken from their sections.

I soon found that a false line had been run due west from the corner and I was told I was wrong. The investigator thought it devolved upon him to examine my instrument. On the previous line—going south—the telescope had been parallel with the needle, now it was at almost a right angle with it; no wonder I lost my bearings! The quarter section post was found a few feet south of my line, near the edge of a little branch, as the field notes indicated. Had the line been north of me, I would have crossed the branch long before. The post on the bogus line stood over 200 feet north of it, set by some surveyor who had had no field notes. After running 41 chains more I came into a cypress pond, and all said I was wrong, as the corner was over 70 yards north of my terminus. The field notes mentioned the pond, and I found some genuine chops running both east-west and north-south and traced them to their intersection.

Suddenly a shot was heard, then a

scream, then angry talking a short distance north of us. I and those along with me ran thither as fast as the deep water allowed and found the investigator limping about and the man with the convictions, also limping, shaking his fist at the former, and both were swearing. In the distance, the boy with the gun was seen running homewards as fast as his legs could carry him.

This is what happened: The investigator wanted to prove that the south line of the section was considerably north of where I claimed it to be. He found a cypress tree that had a bump, which he went to chop into in the hope of finding old axe marks beneath. The boy, unnoticed by him, went behind the tree to shoot at a woodpecker in another tree. It happened that the cypress tree was hollow all the way to the top and full of water. Just as the investigator was about to split the chip, the force of the high column of water broke it out, and it struck his face, followed by a strong stream of ill-smelling water that drenched him. The boy fired his gun the same moment, and the investigator, bewildered, screamed out in fright, and ran. He collided with the man of convictions and both fell over a log, badly bruising their legs. The boy thought he had shot someone and ran away from the scene. After the crowd had gotten over their worst fits of laughter they followed me back into the pond and the investigator sat down on a little slim mossy stump to look after his injuries.

The little stump stood so near where the corner should be that I scraped away some of the moss. Glory! There were the government brands on all four sides and this was the corner without a doubt. Even the man with convictions saw that and said he "knowed" all the time it was there ever since old man So-and-So had shown it to him. He even accused the investigator of knowing of it and hinted that he had all the time tried to mislead me and at last wished to hide the corner by sitting down on it.

I now went due north, first 40 chains and found a true quarter post, and then to a point where the notes said: "Last 8 chains north 8 degrees east." I set a guide marker there and went on in the new direction. Reaching the township line on this bearing I came to the stake before mentioned, but neither it nor any other spot in the neighborhood could get witness trees to fit it. The stake should stand on an Indian mound, but no mound had ever been there. I was puzzled. Going up to the township line the notes said: "80 chains, branch, course east; 82 chains, X branch, course west; 83 chains, X branch, course east." I had crossed the branch only one time going north. I went along the branch westward and soon came to where it made two very sharp bends, like the letter "S," and examining the cypress trees along it carefully I found two that bore the genuine chops. I saw then that Randolph had made a mistake in his notes and written "north 8 east" when he meant "north 8 west." We went back to the guide marker and chained on the new course to the township line. We ended in a brier patch. A persimmon tree grew there, which indicated that the spot was a little higher than the surrounding land. The witnesses should be two cherry trees, but neither post nor witness trees were visible.

I remembered that on the north line of the adjoining section on the west should stand a post 2 chains from the corner I was hunting, belonging to sections in the adjoining township north. I measured west 2 chains but found no post. The man with convictions said he had seen the post and thought it was under a fallen tree. The log was cut off and rolled out of the way. There, broken off, was the post. I was now sure of being right, and so were the rest. The man with convictions offered me a chew, the man with the sore leg offered to take the bandage off and show me the ulcer, and my employer offered to carry my hatchet, so you see, I had risen in their esteem by my success. Even the yellow dogs helped me. They began to scratch in the ground near where the post should be, on their hunt for a rat, and unearthed the remains of the stump of a cherry tree, and,

the witnesses being located, it was an easy matter to set the post in the right place.

We measured 40 chains east and it ended at my temporary post. I found the witness trees and when I went to set the quarter post I found the original post close by, which someone, for reasons of his own, had driven flush with the ground.

This ended the day's work and I had the section outlined. The next day's work was attended with no worry as I had only to run straight lines between the quarter posts. Everyone interested agreed that I had made the survey right, although some of them lost by it, and they were thankful for at last really knowing where their lines were.

From the above it will be seen that a surveyor must know what he is about, that his work is hard and worrying, and that luck has much to do with his success. But it cannot be denied that it also has its humorous and fascinating sides.

Panel Discussions Feature Photogrammetry Meeting

"Photogrammetry Saves Dollars—Don't Hide the Shining Facts!" A panel of eight prominent mapmakers discussed this theme at the Twentieth Annual Meeting of the American Society of Photogrammetry, held at the Shoreham Hotel, Washington, D. C., Jan. 13–15, 1954. Other panel discussions and symposiums that highlighted the meeting were on the subjects of "Engineering Applications of Photogrammetry," "Research in Photogrammetry," "Photogrammetric Optics," and "The Photographic Interpretation Problem."

Separate papers were given on a wide variety of other photogrammetric subjects. Participants in the well-attended meeting included 1060 registrants from all parts of the United States and a number of other countries. Equipment and techniques for a wide range of photogrammetric operations were demonstrated in 28 attractive exhibit booths.

The newly-elected officers of the Society are: Arthur C. Lundahl, *President;* W. Sidney Park, *First Vice-President;* and Robert N. Colwell, *Second Vice-President.* Newly-elected directors are: William E. Harman, Jr., Donald J. Belcher, Eldon Sewell, Albert L. Nowicki, and Francis E. Washer.

Reprints of Articles

Reprints in quantities of 50 or more may be obtained of any article appearing in this issue. Orders must be placed with the Editor-in-Chief, Robert C. Eller, Topographic Division, U. S. Geological Survey, Washington 25, D. C., not later than 3 weeks after publication. Authors who wish reprints of their articles may so indicate when manuscripts are submitted. Approximate prices of 4- and 8-page reprints follow:

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Nomography Applied to Land Surveying

By SERGE A. EMERY

CIVIL ENGINEER, FREEPORT, L. I., N. Y.

NOMOGRAPHY is the science of solving mathematical problems by graphics. A nomogram is a diagram that represents a formula graphically, in which each variable in the formula is represented by one or more graduated lines, and by means of this diagram the solution of the formula for any given set of values may be read off at once by means of an index line.

An engineer is usually too busy and his time is too valuable for him to undertake personally the numerous calculations that almost all engineering entails. He therefore has assistants to make these calculations, but if they are not experienced in computations, they must have recourse to convenient and practically foolproof graphic methods. Nomography provides these graphic methods.

Nomograms have won much favor in different engineering fields, such as: civil, mechanical, electrical, aeronautical, and chemical, because they are simple to use, they save time where the same mathematical formula has to be solved repeatedly using different values, and at the same time they give almost any required degree of accuracy. Concerning time, there are instances where difficult problems requiring several minutes of calculations with computing machines or slide rules can be solved in as many seconds by nomograms. Concerning accuracy, any desired degree of accuracy can be attained, depending on the size of the nomogram and its design. As to simplicity, it may be said that unskilled individuals can perform difficult computations with the use of nomograms as readily as anyone.

In constructing a nomogram it is necessary:

(1) To know the equation involving the variables

(2) To know the range through which the variables change

(3) To determine the proper scale factors, or unit representations, to be employed in laying off the desired scales

(4) To identify the particular case with a type form, if it is possible.

The requirements for graphic accuracy are:

(1) Layout lines should be sharp and light

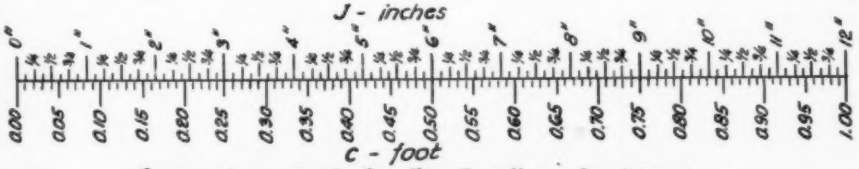
(2) The scale should be as large as practicable

(3) The interval between units should be divided decimally.

Many useful nomograms can be constructed for office and field use in land surveying, but only three typical nomograms will be illustrated and discussed in this paper.

Figure 1 illustrates a simple *conversion scale* between inches and fractions, and decimals of a foot.

The equation for this nomogram is $J = 0.96C$. This conversion scale has for its basis a straight line, on one side of which a scale is constructed for the variable J (1 foot divided into 12 inches, and each inch divided into 8 parts, giving a total of 96 equal divisions for the upper side of the



Conversion Scale for the Equation $J = 0.96\,C$

FIGURE 1

nomogram), and on the opposite side, a scale representing the corresponding values for C (1 foot divided into 100 parts).

The construction of this nomogram is obviously very simple. We need to choose a convenient length of line and then divide the upper part into 96 equal parts and the lower part into 100 parts.

The use of the nomogram is obvious; opposite scale marks, read by the eye only, give the respective equivalents of each other. For example, 5¾ inches on the upper scale is found to be opposite 0.48 foot on the lower scale. Although the size of the illustrated scale is rather small, one can read with ease to the nearest 0.01 foot or the nearest 1/16 inch. For example, 1 13/16 inches is equal to 0.15 foot.

Figure 2 illustrates a nomogram called a *slope chart*, from which can be obtained the difference between a distance measured "along the slope" and the horizontal distance between the two points. Where the terrain has a slope, a distance s can be measured directly between the two points "along the slope." If the difference of elevation h of the two points is known, the horizontal distance d, which is what is usually wanted, is $d = \sqrt{s^2 - h^2}$. In the construction of the nomogram illustrated, an approximate for-

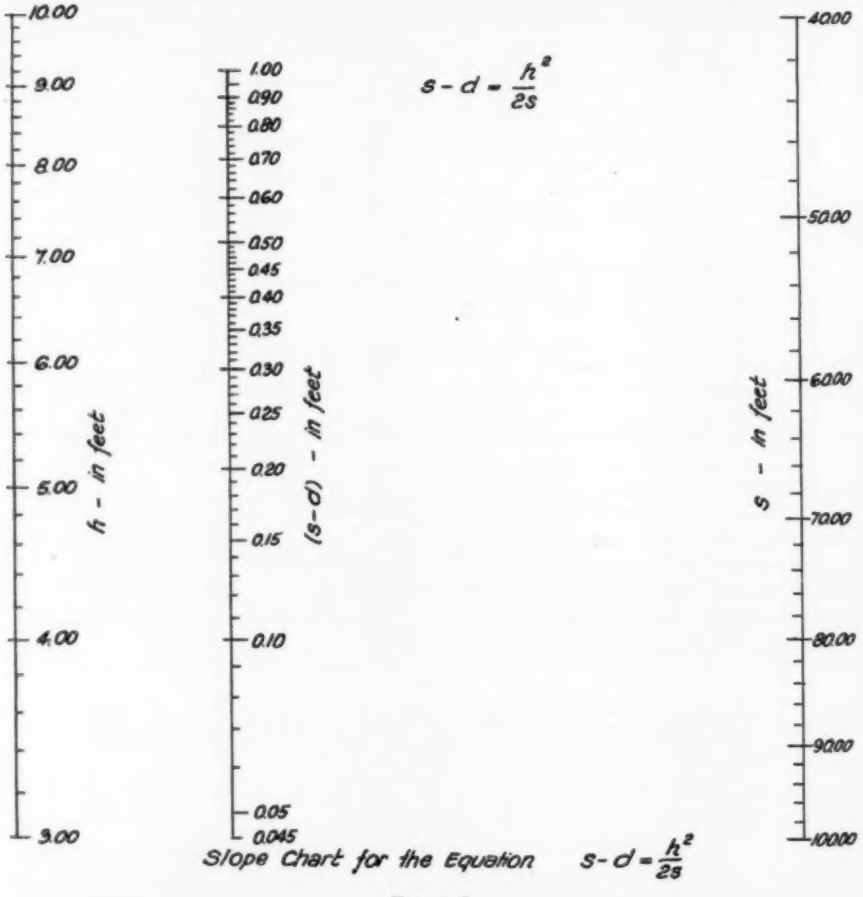


FIGURE 2

mula was used which gives the difference between the slope distance and the horizontal distance, $s - d = \frac{h^2}{2s}$. (*See* page 14, *Surveying*, by Charles B. Breed, 1942.) This formula is correct to the nearest 0.01 foot even where $h = 30$ feet and $s = 300$ feet.

The slope chart consists of three parallel scales. The range for h is taken as 3 to 10 feet, and the range for s as 40 to 100 feet. A length of 5 inches was chosen for the scales.

To construct the slope chart for equation $s - d = \frac{h^2}{2s}$:

(1) Place the parallel scales for h and s a convenient distance apart, in the illustration 4.8 inches.

(2) Graduate them in accordance with their scale equations.

(3) Locate the scale for $s - d$.

(4) Graduate the $s - d$ scale from its scale equation.

The scope of this article does not include the calculations of the scale equations for h, s, $s - d$, and for the location of the scale for $s - d$, but a practicing engineer should have no difficulty with them.

A straight line (index line) passing through points representing h and s values always passes through a point on the $s - d$ line representing that value of $s - d$ which is determined by our formula for the chosen value of h and s. For the ranges through which our variables h and s change, the result for $s - d$ can be obtained to the nearest 0.01 foot. For example, for $s = 68.0$ feet and $h = 6.20$ feet, the index line will intersect the $s - d$ scale at 0.28 foot; the computed value is 0.283 foot. For $s = 85.0$ feet and $h = 8.25$ feet the index line will intersect the $s - d$ scale at 0.40 foot; the computed value is 0.400 foot. As can be seen, the chart is sufficiently accurate and is very easy to use where interpolation is necessary.

Figure 3 is a nomogram from which to obtain *the change in length of a steel tape caused by change of temperature.* Steel tapes are usually standardized at a temperature of 68° F.

If a distance was measured with a steel tape when the mean temperature was 32° F. and was found to be 950.35 feet long, this value would be in error by 0.22 foot, assuming the tape to be correct at a temperature of 68° F.

Considering the high value of land in some areas, and the strict requirements of accuracy expected from surveying, there is no doubt that the effect of temperature on steel-tape measurements should be given due consideration.

Unfortunately, the formula for computing changes in tape lengths caused by temperature changes is rather complicated for use in the field. This formula is: $C = 0.0000065\ L\ (T - T_0)$ where C is change in length of tape, L is the measured length, T is temperature (in degrees F.) at the time of measurement, and T_0 is standard temperature, in degrees Fahrenheit.

The nomogram in figure 3, constructed in a **Z** shape, presents an excellent solution of this problem. An accuracy of 0.01 foot can be obtained, even at this small scale, for a total length of 2,000 feet and a temperature difference of 25° F., or for a length of 1,000 feet and a temperature difference of 50° F.

In this nomogram we have two parallel scales, one for $T - T_0$, and another for C, and a diagonal connecting the zeros of the two parallel scales for the values for L. The range for C is from 0 to 0.34 foot, and for $T - T_0$ from 0° to 68° F. The length of the parallel scales is 5.1 inches.

This **Z**-type nomogram can be constructed for our equation simply and graphically.

(1) Place the two parallel scales for C and $T - T_0$ a convenient distance apart, say 6.0 inches.

(2) Plot the values of the variable C from right to left at equal intervals from 0 to 0.34, and values of the variable $T - T_0$ from left to right from 0 to 68, also at equal intervals.

(3) Graduate the diagonal scale (for L) as follows. Choose one point, for instance 50, on the top vertical scale (this chosen point can be any point on the top scale). Using the formula, with $T - T_0$ always 50, compute values of C for varying values of L. For example, for values of L at each 50 feet from 0 to 1,000, and for each 100 feet from 1,000 to 2,000, etc. Connect by straight lines the chosen point (50) on the $T - T_0$ scale with each of the computed values of C and, where these connecting lines in-

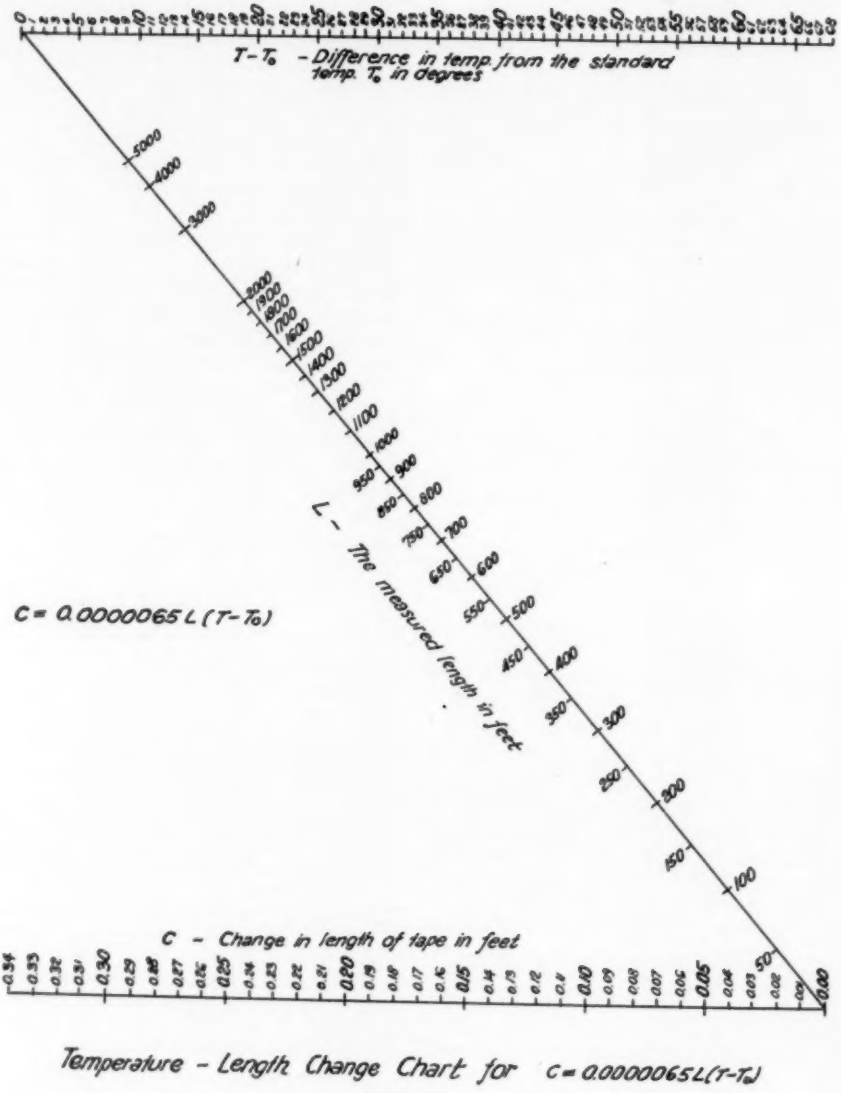

T – T₀ – Difference in temp. from the standard temp. T₀ in degrees
L – The measured length in feet
C = 0.0000065 L (T – T₀)
C – Change in length of tape in feet
Temperature – Length Change Chart for C = 0.0000065L(T–T₀)

FIGURE 3

tersect the diagonal, plot the respective L values. By this means the diagonal scale is graduated.

For $L = 575$ feet and $T - T_0 = 100 - 68 = 32°$ F., connect 32 on the top scale with 575 on the diagonal; the prolongation of this line to intersect with the bottom scale gives $C = 0.12$ foot; the computed value is $C = 0.1196$ foot.

In order to obtain greater accuracy from the nomogram, the values of L and $T - T_0$ can be changed by multiplying one and dividing the other by the same factor, in order to utilize those parts of the scales that are farther apart. For example, let $L =$

3,800 feet and $T - T_o = (80 - 68) = 12°$; but we can use $12 \times 4 = 48$ on the top scale, and on the diagonal $3{,}800/4 = 950$. Now connecting these values and prolonging this index line we will obtain a much surer value on the bottom scale, $C = 0.30$; the computed value is $C = 0.2964$.

In using figures 2 and 3 it is immaterial which two of the three variables are given and which one is to be found.

As was mentioned above, many useful nomograms can be constructed for field and office work in land surveying. These nomograms can be used for determining sag; tension; areas of sectors, triangles or trapezoids; lengths of chords; applications of the sine rule; conversion from rectangular to polar coordinates; and so on.

In some instances, the variables will not be limited to three—there may be four or more; and some constructions will involve curves and will not always be simple.

The basic knowledge required for the construction of nomograms is the knowledge of logarithms, determinants, algebra, plane geometry, and analytic geometry. It would be very useful to include a short course in the study of nomography in any curriculum for future candidates for the degree of Bachelor of Science in the field of surveying and mapping.

Faster Map Production Methods

Negatives are out of style at the Army's Engineer Research and Development Laboratories, Fort Belvoir, Va., where topographic engineers are taking a "positive" approach in the field of map reproduction.

Since World War II brought maps down to the common soldier, methods to produce them in great quantities are urgently needed. In an effort to develop a method which will provide photomaps in great numbers for quick delivery to troops in the field, ERDL is investigating the ammonia process which makes prints from a positive film.

The ammonia process, often referred to as the diazotype method, utilizes a paper coated with a light-sensitive dye intermediate which can be selectively decomposed or bleached by light. When this paper is exposed to light in contact with transparent positive original, and after exposure is subjected to ammonia fumes, a direct positive photographic print of the original is produced.

Present methods of ammonia process print production from aerial negatives require that a conventional silver halide film positive be made from the negative. The positive is produced by contact or projection printing using conventional photographic materials, methods, and processing. However, the procedure is exacting in that the film positive must be of a specified contrast and density in order to produce satisfactory prints on the continuous-tone ammonia process paper now available.

Once a film positive is available, ammonia process prints are easy to make in a specially designed machine. Only two direct steps, printing and dry development, are necessary. Production of these prints is simple when compared with the making of photographic prints. Five processing steps (darkroom, developing, fixing, washing, and drying) are eliminated in the production of large quantities, resulting in great savings in both time and labor.

Continuous studies are being conducted by Army Engineers to improve materials used in the method and to perfect the promising process. Also under development is printing and processing equipment designed for truck mounting and air transport for delivery to topographic units operating in forward areas.

Aviation Development and Its Mapping Needs

By PAUL A. SMITH

UNITED STATES REPRESENTATIVE ON THE COUNCIL OF THE INTERNATIONAL CIVIL AVIATION ORGANIZATION, MONTREAL, CANADA

THIS year, 1953, the United States celebrates the 50th anniversary of man's first successful effort to propel himself through the air. A half century after the historic flight of the Wright brothers at Kitty Hawk, N. C., air travel is commonplace almost throughout the world.

The phenomenal development of air transport and aviation has had a profound impact upon society generally, but especially upon certain of the engineering professions. It is only natural that members of the American Congress on Surveying and Mapping should give some thought to trends of aviation and their possible effect on the activities here represented.

The subject has two reciprocal aspects: what mappers do for aviation, and what aviation does for mappers. Within this broad framework I shall try to outline briefly certain clear trends in aviation, in terms which seem to me of most direct interest in this branch of the engineering profession, and to indicate some of the services surveying and mapping provide, or can provide, for aviation.

As to the future, some recognized authorities in aeronautics have ventured predictions and I have drawn freely from the more conservative of these for such material as may be applicable to the subject of this paper.

My comments apply primarily to civil aviation, but insofar as surveying and mapping are concerned, the needs of civil aviation are largely common to those of the military. In this field, as in the whole field of aviation, it is well to remember that the roots of air power are in air commerce and the technological advances demanded by the exigencies of air power will accelerate air commerce.

GROWTH OF AIR TRANSPORT

Among the factors commonly used in measuring growth of air transport and aviation generally, aircraft speed, altitude, and weight seem especially pertinent for the purposes of this paper. Load-carrying capacity and flight range could be included, but these characteristics are probably of less direct interest.

These performance factors, as they are known in aviation circles, depend on the kinds of aircraft structures, power plants, and fuel, which in turn are influenced by many other parameters including the relative economic advantages and physical potentials of piston engines and propellers, turbopropellers, turbojets, ducted-fans, ramjets, and rocket power. I have also assumed that primary interest is in manned aircraft structures, in particular the conventional airplane, which varies widely in design from light to heavy and slow to fast, and rotating wing aircraft like helicopters. Although guided missiles have surely added important demands on surveyors and mappers, suitable information on the most recent developments is not yet available in published form.

Trends in speed and altitude are of special interest to those concerned with aerial surveying and air navigation, including aeronautical charts, air-navigation radio aids, air-traffic control, and the enroute and terminal navigation facilities.

Trends in weight, load capacity, and range of aircraft are involved in problems of airport terminals, municipal developments, air-traffic potentials of communities, and the design and installation of terminal facilities needed to handle such traffic.

Presented at the Thirteenth Annual Meeting, American Congress on Surveying and Mapping, Washington, D. C., March 23–25, 1953.

Increased weight and speed with associated high wing-loading result in longer take-off runs and flatter take-off and landing trajectories. Jet propulsion adds to this trend. Concentration of air traffic in airport approach areas and increasing population density in many of the same areas have resulted in regulations requiring that aircraft be able to clear all obstructions in these critical zones by somewhat wide margins and under adverse conditions. All these trends call for more comprehensive and accurate information on heights of buildings and obstacles located in an increasingly large radius around the major airports.

Fuel load and pay load combine with the flight length to make the take-off the critical part of a flight—from the standpoint of economics as well as safety. Lack of accurate positions and elevations of obstructions in the take-off paths for several miles off the ends of major runways may work an economic penalty on the operator by forcing him to reduce the gross take-off weight below that for which the aircraft is designed. In order to ensure that the aircraft can safely clear the obstructions under the most adverse conditions of flight, this reduction might be either in fuel or in pay load. If it is taken from fuel, the range of the flight may be penalized. If the pay load is reduced, the economy of operation is more directly affected. The approach and landing path is of even more importance to the safety of aircraft landing in adverse weather.

Aircraft operators want to fly faster and farther with heavier loads as economically as possible. The urge to reduce cost per ton-mile dominates all commercial service, and this has been the major influence in increased size of airplanes. The maximum gross take-off weight of aircraft now in commercial service or expected to be put in service by 1954 is about 83 tons. (The French SNCA SE 2010—165,000 lbs.; Boeing 377—145,800 lbs.; Lockheed Constellation 1049C—130,000 lbs.; and Douglas DC—7—122,000 lbs.)

The size and weight of air-transport aircraft seem to be reaching a point of diminishing returns. Aircraft designers and producers are concerned by the rising trends in weight, complexity, and cost. It has been pointed out, for example, by Heinemann[1] of the Douglas Aircraft Co. Inc. that, if the gross weight of a large modern aircraft is increased by 10 percent in added equipment, then the wing area, power plant, fuel, and structure must be increased with a resulting 100 percent additional weight. This means, in the simplest terms, doubling the original gross weight if the same strength and performance are maintained. And, of course, the operator is penalized in his load-carrying capacity by any surplus weight in auxiliary equipment. These hard economic facts will continue to dominate the design of all airborne navigation devices and related equipment in which the chart maker has particular interest.

Airport providers have long been concerned over rising trends in over-all sizes and weights of aircraft, because these factors are reflected in increased runway strength and length, and consequently in airport construction and maintenance costs. Nevertheless, so long as increase in aircraft size reduces substantially the unit operating cost, it is likely to continue. But Dr. Edward Warner,[2] President of the Council of ICAO, has recently pointed out that, although the average seating capacity of transports more than doubled between 1938 and 1946, it increased only 30 percent from 1947 to 1951.

From the increase in aircraft speeds over the past two decades, one might be tempted to conclude that commercial air transports of the near future will be flying at very great speeds, far into the supersonic range. This is unlikely. The dominant factor in aircraft speed is the cube law of the power required. Power costs money, and beyond a certain point speed just won't be worth the cost. I share the view of those who believe that "the optimum speed of manned aircraft, both military and commercial, will

[1] HEINEMANN, E. H.: "Airplane Weight and Cost Can be Reduced," Inst. Aero. Sci., *Aeronaut. Engr. Rev.*, Jan. 1953.

[2] WARNER, EDWARD: "International Civil Aviation in 1951," *ICAO Monthly Bulletin*, May 1952.

be found to be somewhat less than we now have in mind."[3]

Further on speed, Dr. Furnas, Director of the Cornell Aeronautical Laboratory, has said:

The speeds which are utilized in any form of commercial transportation represent an uneasy truce between the laws of physics and those of economics. Though the laws of physics are immutable, the pattern of economics does change, so it is hard to make any definite prediction about optimum points in the future. The task is made somewhat simpler, however, by the fact that physical limitations on attaining high speeds of aircraft have been virtually removed during the last two decades, so the economic factors now make up the principal determinant. The economic optimum is the resultant of a battle among the cube law of the power required for speed, fixed cost of operation, the degree of utilization of manpower and equipment, and public demand for the commodity of speed. These parameters are common to any form of transportation. Aircraft, however, do have the advantage of a third dimension, which makes it possible to acquire additional increments of speed by going to higher altitudes, without substantial additional cost, in response to either public demand or weather conditions. This is particularly true for longer flights.

For the past two decades, the estimates of the students of air transportation of the economic optimum speed have been curiously close to the speed performance of the best commercial aircraft available at that time, indicating that there may be some element of rationalization in the process of arriving at the figure. However that may be, it is my opinion that the speeds which will be utilized for commercial operations within the next half century will not be in the realm of the fantastic. I cannot visualize regular commercial airliners traveling at supersonic speeds, even at very high altitudes. It just costs too much and there is too little to be gained. If I may venture an opinion, it would be that the commercial cruising speeds for long-distance flights will probably settle down in the neighborhood of 600 miles per hour, while for the shorter distances a prosaic 300 miles per hour will prove to be adequate. This will represent substantial progress over the present, but nothing really earthshaking.

[3] FURNAS, C. C.: "The Next Half Century," Inst. of Aero. Sci., N. Y., Jan. 27, 1953.

AIR TRAFFIC OF THE NEAR FUTURE

It seems fairly clear that large, high-speed, high-altitude aircraft will carry the long-haul traffic—transocean and transcontinental—at speeds around 600 miles per hour, supplemented by intermediate sized aircraft for shorter distances operating at speeds of about 300 miles per hour. An additional service for very short haul traffic (say less than 175 or 200 miles) is expected to develop, and some authorities believe that in this type of service the helicopter will soon take a prominent place. The English are among the leaders in this thinking, as the air-traffic needs of a densely populated, small, geographic area like the United Kingdom stimulates a solution of this nature. Peter Masefield,[4] chief executive of British European Airways, for example, has indicated that a helicopter of gross weight around 48,000 pounds, a cruising speed of 160 miles per hour and rotor diameter of 72 feet would be desirable.

A recent study made by the consultants for the Port of New York Authority lists among its conclusions:

Within the next few years a 10-place helicopter will be used in common carrier service; . . . by 1958, 30-place helicopters will be available for common carrier commercial operations; . . . while the earliest common carrier use of the helicopter will probably be as an airport shuttle service beginning about 1955, it has even greater potentialities in the field of short-range inter-city travel and in the expanding area of commutation service.[5]

William Littlewood, Vice President of American Airlines, on the other hand, believes that, although the helicopter "will eventually find its economical niche," its inherent mechanical complexity and the large

[4] MASEFIELD, PETER: Speaking before the Helicopter Association of Great Britain, Nov. 7, 1952.

[5] Port of New York Authority, Aviation Department: "Transportation By Helicopter 1955–1975, A Study of Its Potential in the New Jersey–New York Metropolitan Area," Nov. 1952.

proportion of power required to sustain flight "will continue to make the units very expensive in first cost, relatively expensive in operating costs per unit mile and fraught with problems of dependability."[6]

Regardless of their eventual place in commercial air transport, helicopters have great promise in surveying and civil engineering construction. They are already being used to a limited extent in surveying reconnaissance, in transporting survey parties to and from otherwise inaccessible points, and in other surveying operations; and their unique properties make them especially attractive for a variety of surveying applications. Although the helicopter's navigational requirements might seem to be somewhat similar to those of other types of low-speed, low-altitude aircraft, they will create a special problem in those areas where both helicopters and fixed-wing aircraft operate because of the great differences in cruising and approach speeds, and they will probably require a considerably more accurate system of radio navigation than is available today.

Cruising altitudes of large propeller-driven commercial aircraft averaged around 20,000 feet until the advent of jet propulsion when, with increased speeds and power, the cruising altitudes jumped to about 40,000 feet. Littlewood[6] has said, "Once 30,000 feet operating altitude is exceeded—and exceed it we must for jet operations—the problems are largely ones of degree and not of nature. . . . It seems a reasonable conclusion . . . that the probable altitude range of efficient jet transport operations will lie between 30,000 and 55,000 feet."

CHARTING NEEDS OF AVIATION

If these appraisals for the future are accepted, then one may draw certain conclusions as to the charting needs of aviation. These conclusions are based on the three cardinal principles that should guide all chart producers. They can be stated in three words: utility, reliability, and availability. Each is an equally important link in the chain. Thus, a chart perfectly designed for the need of a particular user and absolutely accurate and current is of no value whatsoever to that user if it is not available when and where he needs it. Alternatively, 100 percent availability of charts that are wholly unreliable or illegible could be even worse than no charts at all.

Utility, or the use for which the chart is designed, usually establishes the scale and size of sheet; the scale in turn controls the amount of legible material that can be shown; and in my view, legibility demands simplicity. Reliability calls for accuracy and "up-to-dateness." Availability depends on the efficiency of the distribution system, and the systematic publication of when and where the latest issues are obtainable.

On these bases it is reasonable to conclude that something like the present radio-facility charts issued by the Department of Commerce will predominate for some time, but that a navigational need will continue to be felt for such basic charts as the Sectional and World Aeronautical Charts at the scales of 1: 500,000 and 1: 1,000,000, not only to fill the requirements of the slow and intermediate speeds and ranges, but also the requirements of aviation training, planning, and development. Most of the high-speed, long-range aircraft, however, will be better served by a scale of about 1: 5,000,000. Speed, altitude, range, and the need for more nearly continuous positioning argue for a considerably simplified cartographic style.

On cartographic style, I have few personal observations. Much effort has been devoted to portrayal of topographic relief for aeronautical charts. During the past three decades almost every conceivable combination of contours, gradient tints, hill shading, spot elevations, and even perspective sketching have been tried in the United States and other countries.

I admit some personal contributions to the confusion on this subject in years now passed. At this time, and from a somewhat more detached perspective, my present conclusions are that contours on aeronautical charts of scales of 1: 500,000 and smaller are unnecessary, if not useless; hill shading

[6] LITTLEWOOD, WILLIAM: 16th Annual Wright Brothers Lecture, Washington, D. C., 1952.

is simply an expensive delusion not worth the cost; and that the most satisfactory combination for the pilot and navigator is, and will continue to be, a simple arrangement of hypsometric tints (without contours) with a judicious but generous use of spot elevations. The reasons are simplicity and economy of production and legibility for the user.

The pilot who flies only in clear weather has quite a different need from those who are fully equipped for instrument flying. The number of aircraft not so equipped is steadily decreasing. In the United States, as in Europe and some other parts of the world, air-traffic control is becoming an increasingly acute problem. The result is a demand for reliable positioning of all aircraft at all times—not just in times of low visibility as in the past—and thus an increased need for more accurate knowledge of obstructions and air-traffic aids, all of which depend on accurate basic surveys.

Some kind of positive and simplified airborne device like the pictorial computer which will indicate the aircraft's position continuously or at very frequent time intervals seems to be the answer. A number of studies and trials are being made of automatic position-indicating devices in the United States and elsewhere, but no wholly satisfactory system that will do this has yet been put into wide use. It seems that it will be only a matter of time before it will. Future plans for a system of radio air-navigation aids common to the various civil and military services include such an arrangement. This is already regarded as a necessity by a number of air-transport operators. The system will have to be based on the bearing-distance principle, (e.g., the VOR-DME system) on which the present U. S. system of aids has been built.

On this subject the Administrator of Civil Aeronautics has recently said, "The needs for the future include provision of pictorial or symbolic presentations for giving instructions to the pilot or displaying his position, and equipment for keeping 50 or more aircraft under control in the same area. . . . Improved displays showing not only aircraft near an airport but enroute from one airport to another are scheduled for development and evaluation. The pictorial display, it is believed, will replace much of the information which traffic controllers now maintain on paper slips, and simultaneously reduce the communcations load imposed by pilot position reports."[7] It is almost needless to say that the introduction of such devices will have a profound effect on the aeronautical chart of the future in all its forms, but the cardinal principles—utility, reliability, and availability—will still apply.

WHO OWNS THE AIR SPACE?

The surveyor will always be concerned with problems of delineation of property and boundaries, and the legal documents and decisions that affect his work. Increasing air traffic over densely populated areas brings up a number of new questions in air law and property rights. Who owns the air space, and to what altitude? When and under what conditions does flight over private property constitute trespass? To what extent is the aircraft operator liable for damages to people and property on the surface? In recent years a number of courts have handed down judgments on such questions relating to ownership of the air space. Although in the realm of speculation, they could, in the foreseeable future, raise some interesting and unique problems for surveyors. I am not aware, however, at this time of any specific cases that have involved surveyors.

AIRBORNE SURVEYS

Remarkable advances have been made in aerial surveying (including aerial photogrammetry) contemporaneously with the availability of more suitable aircraft for the job. The aerial surveyor already has a wide range of aircraft types for his possible needs. He will have an even wider choice in the future. Speed and altitude performance is

[7] HORNE, C. F.: "Air Navigation Aids and Air Traffic Control," Amer. Inst. of Elec. Engrs., Dec. 9, 1952.

most important in this respect; and the helicopter widens his choice.

The early tests of aerial geophysical reconnaissance and exploration are promising, and also in these fields a wide range of performance is available.

The feasibility of determining the geographic positions of points on the earth's surface through the use of such devices as Shoran with aircraft has been demonstrated and applied. One of the most extensive of such projects is being carried out by our Canadian colleagues.[8]

In short, there will be increasing opportunities for applying already known physical and electronic devices to airborne use in surveying and mapping. Many new combinations will be tried. Those that are most acceptable will be the ones that offer greatest over-all practical economy—not necessarily those that may be most attractive in operational nicety.

SAFE AIR TRANSPORT

Safety in air transport is always of wide interest; and any treatment of trends in aviation, even one so sketchy as this paper, would not be complete without it. Safety of air transport should be coupled with regularity of service because a rigid adherence to schedules in all kinds of weather, as in other forms of transport, usually entails additional risks. Alternatively, higher safety may be possible at some sacrifices in regularity.

The basic objective of the U. S. Civil Aeronautics Act is a safe, regular, and economical air-transport system which will be in the public interest, convenience, and necessity. Likewise, one of the basic aims of the Convention on International Civil Aviation is to "meet the needs of the peoples of the world for safe, regular, efficient, and economical air transport." The vast system of U. S. Federal Airways, the efforts of the U. S. Civil Aeronautical Administration, and the U. S. Civil Aeronautics Board as the regulatory agency, are devoted to these aims. The International Civil Aviation Organization with 59 member states, and its permanent Council of 21 governments strive continually toward the objective of safety, regularity, and efficiency in civil aviation.

These efforts are bearing fruit. Scheduled airlines have greatly improved their safety records during the past two decades. The record of all domestic and international scheduled air services is now down to about 1.3 passenger fatalities per 100,000,000 passenger miles. The record of U. S. scheduled airlines for the calendar year 1952 was only 0.38 fatality per 100,000,000 passenger miles—the best ever achieved in the United States. (In 1938 it was about 4.5.) In the same period (1952) the volume of air traffic reached a new high. The U. S. domestic airlines were, as of January 1953, scheduling about 1,900 flights every day, making about 13,000 take-offs and landings daily. On February 11, 1953, they completed a full year without a single passenger fatality. During this record year they carried over 25,000,000 passengers a total distance of 13 billion passenger miles.

There is no simple way to state an index of regularity. Although it must be coupled with safety, it is right and proper that first emphasis is always on safety. Reliability of scheduled air services has steadily improved over the past decade. General Milton W. Arnold,[9] Vice President of the Air Transport Association, has pointed out that during 1949, the U. S. scheduled airlines completed nearly 98% of the total scheduled mileage, and more than 99% for 6 consecutive months of the same year. His analysis also showed that during the previous 4 years flight concellations had been halved. This improvement in dependability accompanied

[8] RANNIE, J. L.: "Shoran-Electronic Tool for Control Surveys and Mapping," *Civil Engineering*, A. S. C. E., Aug. 1950.

Ross, J. E. R.: "Shoran Operations in Canada," SURVEYING AND MAPPING, Oct.–Dec. 1952.

[9] ARNOLD, GEN. MILTON W.: "Post War Progress in Scheduled Airlines' Safety, Regularity and Air Lift Potential 1946–1950 Inclusive," April 10, 1951. (Talk before The Press Wings Club, New York City.)

the remarkable improvement in safety.

Surveyors and mappers have contributed to this commendable record through the production, maintenance, and distribution of reliable charts, and in the surveys which make available accurate geographic positions of air-navigation aids and of natural and man-made obstructions reaching into the air space, and in other ways. Aviation's continuing development will surely open increasing responsibilities and opportunities for them in the years ahead.

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International Cooperation in Mapping

By BRIGADIER GENERAL ALBERT C. LIEBER
ASSISTANT CHIEF OF ENGINEERS FOR MILITARY OPERATIONS

MAPS have an increasingly significant role in the modern world. We are daily being made more aware of the interrelation of maps and world affairs. This map consciousness has developed with the realization that, aside from their military importance, adequate maps provide the information required for the rapid economic and industrial development required by the free world today. The need for these maps is brought into sharp focus at this meeting for the Congress has, very appropriately, selected for its main theme: "Surveys and Maps Provide the Engineering Information Essential to Economic Planning and Development."

Some typical examples of development projects that have become increasingly important internationally are: Domestic and industrial water supply; flood control; irrigation; agricultural development; soil utilization and land improvement; mineral and fuel development; power development; development of energy resources; navigation; road and railroad design and construction; and many other public and civil works. There is an expression that very aptly describes the value of maps in military operations: "An Army without maps is an Army without eyes." It can be applied very appropriately to any program involving economic planning and development, for without the proper maps any such program is almost certain to wind up in a blind alley.

NEED FOR JOINT EFFORTS

The free nations of the world are acutely aware of their interdependency and fully realize the need for international cooperation in those matters that affect the welfare and security of any one of the nations. As the all-important *map* represents one of these critical elements, international cooperation in mapping is not only desirable but is an urgent necessity.

The United States has long recognized the international aspect of mapping and the need for joint efforts. In the year 1904, President Theodore Roosevelt extended welcome to the Eighth International Geographic Congress which convened here in Washington. This Geographic Congress was devoted to spreading geographic and cartographic knowledge throughout the nations of the world. It is of interest to note that the goal we are trying to attain in international cooperation was envisioned by Admiral Robert E. Peary in a paper delivered before the Eighth International Geographic Congress. He said: "The meeting of this congress in the United States holds great possibilities of good for us by bringing us into direct contact with the work of our colleagues of other countries. I earnestly hope that this session of the congress will prove a great and lasting stimulus to the interest of our people in geographic and allied research." These words are as topical and current today as they were half a century ago.

The cartographic sciences have been aided immeasurably by the many and varied contributions made by the Eighth International Geographic Congress. What probably constitutes one of the most valuable contributions to cartography, however, occurred earlier, in 1891, on the occasion of the Fifth International Geographic Congress, when proposals were first advanced for an International Map of the World. This new mapping concept envisaged the compilation of a map of international scope, with uniform scale, legend, and projection. The success of this undertaking is attested by the many maps already produced by the 35

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participating countries in the world-wide IMW mapping program, and the general acceptance of the IMW sheet lines and numbering system for maps of many kinds.

During World War II the value of a collaborative effort in mapping was again highlighted. At that time the United States was woefully lacking in map coverage of foreign areas, although we did possess an almost unlimited capacity for the mass production of maps. Our allies, on the other hand, were sorely lacking in production capacity but possessed comparatively good map coverage. Responsibilities were divided accordingly, and it was only through this happy combination, this interdependency, that we were successful in meeting the mapping demand, all of which contributed materially to the final victory.

In the years following World War II, cooperative action between domestic and foreign governmental mapping agencies continued to achieve further progress in international mapping. Under the auspices of the Joint Mapping and Photographic Committee (JMPC), there was established in 1946 a program for the standardization of topographic map symbols and specifications for mutual use by Federal mapping agencies in the United States. The technical manuals prepared under this program are comprehensive, covering all phases of map preparation. They were used as a basis for subsequent agreements between the United States, Great Britain, and Canada, and are being used as the foundation for agreements among the NATO nations.

The Corps of Engineers started immediately after World War II to formalize its working relationships in mapping by agreements with its wartime allies. This action was extended, until now we have some type of mapping agreement with practically every country outside the Iron Curtain. These agreements, for the most part, pertain to the exchange of maps and map materials. However, some of them provide for cooperative effort in mapping operations of mutual interest. As you know, large-scale topographic mapping is expensive. If countries can freely exchange mapping products with one another it simply means that the limited mapping funds available to each country are that much more effective in meeting their requirements. Moreover, you get the benefit of production of maps of a country by the agencies *of* the country, who, of course, know the history of any particular map series and are also in the best position to perform field edit.

INTER-AMERICAN GEODETIC SURVEY

To facilitate and expedite mapping progress among the nations of the Western Hemisphere, another step forward was taken in the interests of cooperative mapping, when, in 1946, the Inter-American Geodetic Survey was established by the United States. This agency was created at the recommendation of the Commission on Cartography of the Pan-American Institute of Geography and History, and it functions as an organization of the U. S. Army, Caribbean. The structure of this organization is unique; the IAGS headquarters is in the Canal Zone, with project offices maintained in each participating country. It is staffed by officers of the Corps of Engineers, although the majority of its employees are civilian technicians. The main objectives of the IAGS are to establish a common geodetic datum for Central and South America, to connect it with the North American geodetic datum; and to assist and encourage the various nations in mapping their individual countries. The common datum is important in that it will provide the framework on which all maps and future surveys of Latin America will be based.

A first-order triangulation network, linking the islands of Cuba, Haiti, and Jamaica, was recently established by the IAGS in collaboration with the cartographic agencies of the three islands. Here was a job of which many said "It's impossible—it can't be done —the lines of sight are too long to be observed." The IAGS undertook the work enthusiastically, survey instruments were set up on strategically located mountain tops, and with the utilization of specially equipped aircraft beacons it was possible to take observations on lights spaced more than

200 miles apart. The "impossible" mission was successfully completed in the short space of 5 weeks. This is typical of the work being done by IAGS.

Although its efforts, thus far, have been devoted principally to the establishment of the geodetic foundation, the IAGS has achieved remarkable progress in supplying the impetus for the accomplishment of many other phases of cartography by the Latin American nations. This has been done by many means; one of which was the establishment of a school in Panama for the purpose of teaching Latin American technical personnel the latest mapping methods. All indications are that the Inter-American Geodetic Survey constitutes a major factor in achieving the goal of hemispheric solidarity and unity of effort among the 18 nations represented in this great Pan-American enterprise.

NATO MAPPING PROGRAM

With the formation of the North Atlantic Treaty Organization (NATO) and its attendant cooperative mapping program, an excellent opportunity was presented to weld into one coordinated effort the over-all mapping needs of the member nations. This is the most important milestone thus far achieved toward international cooperation in mapping. The ultimate aims and objectives of this program are:

(1) The promulgation of standards for the various types of maps prepared by each nation to attain uniformity in such items as map scales, sheet lines, symbols, and terminology. This will enable all participating nations to use, without special instructions, the maps produced by any one of the nations. It is gratifying to report that the international aspects of this phase of the program are now being felt, as reflected by the bilingual and trilingual treatments on the maps currently being produced.

(2) The provision for the regular exchange between the nations of maps, source material, reproduction material, geodetic information, and other related data.

(3) The interchange of information, among the nations, of current and proposed mapping activities.

(4) The exchange of technical personnel between mapping agencies of the nations concerned for advanced studies, and for exchange of ideas and information on technical methods employed in all mapping operations.

When this opportunity for promoting international cooperation in mapping presented itself, we were alert in grasping it. The Army Map Service of the Corps of Engineers became the driving force behind the movement. At first, many perplexing problems were encountered which defied solution. Principal among these was the situation where the existence of many divergent systems of unrelated grids and differing datums vastly complicated the use and preparation of European maps. Based largely on recommendations advanced by the Army Map Service, a uniform grid system, devised to overcome previous deficiencies, was adopted for use by all the nations participating in the cooperative program. The problem of differing geodetic datums offered a problem of monumental nature, and it was only through all our combined efforts that the European Adjustment Net was established. Now, for the first time in history, it is possible to base all ground control in Europe on one uniform datum.

I should like to say a word or two about the military organizations in Europe that have the responsibility of supervising the mapping program under NATO. As you all probably know, the name of the highest military headquarters is SHAPE. Within SHAPE there is a small staff element under the supervision of the Engineer which is responsible for establishing policies and priorities as to the order in which the different parts of Europe will be mapped or remapped. Incidental to this map revision program, of course, is the grid conversion program which I have just mentioned. SHAPE decides the order in which the different blocks of maps of Europe having the old grids will be physically replaced in map depots by maps bearing the new UTM grid. After SHAPE has promulgated the program, the various nations making up NATO go to work with their military or civilian cartographic agencies to make the geodetic computations and do the cartographic drafting required; then at some specified date in

the future, set far enough ahead to allow time for quantity printing and delivery, the map stocks are physically replaced.

Much of the operational supervision involved has been delegated by SHAPE to probably the principal subordinate command, which is known as Allied Land Forces, Central Europe, usually abbreviated to ALFCE. ALFCE has a Geographic Section under whose sponsorship international meetings are held at about 6-month intervals. The first of these was held in May 1952 in Washington, with G-2 of the U. S. Army as the host, with the actual sessions taking place at the Army Map Service. The second meeting was at ALFCE Headquarters at Fontainebleau in November 1952, and the third one will probably be there, too, in the spring of 1953.

To these frequent meetings, all the NATO nations send representatives, either military or civil, depending on whether the national policy is to have maps produced by military or civil agencies. The deliberations of these meetings go into great detail as to which nation will undertake the revision of which map series at what scale; and numerous details of symbolization, sheet lines, geographic names, exchange of reproduction material, format for trig lists, marginal data, and so on, are agreed to. These meetings of the map-producing agencies of the NATO nations, occurring as frequently as they do, are probably one of the most tangible present-day manifestations of international mapping cooperation in action.

A TREMENDOUS TASK

Thus, it can be seen that a cooperative venture of this broad scope involves many ramifications. I am proud to state that the extensive effort of all participants has achieved remarkable progress in making all phases of the program a reality. And, although what already has been accomplished in this cooperative program is impressive, a tremendous task remains before our goal is completely attained.

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Simple Machine Method for Area Computation

By HENRY G. WEISSENSTEIN

ALBERT E. POHMER, CIVIL ENGINEER AND LAND SURVEYOR, BALTIMORE, MD.

MOST SURVEYORS are familiar with the use of calculating machines for surveying computations. Their obvious advantages over logarithms have made them an indispensable tool in the office of the up-to-date engineer and land surveyor.

Not all surveyors, however, have adapted their computation methods to the peculiar qualities of modern calculators and taken full advantage of them. Many still break their computations down into steps and perform each of them separately, as one has to do with logarithms, without utilizing the decided advantage of the calculating machine which permits the combination of several operations. In a well-organized calculating machine procedure, unnecessary intermediate results do not have to be recorded and certain steps necessary in other methods can be omitted altogether.

Standard surveying textbooks do not include chapters on machine methods of computation and consequently there are not many engineering graduates who really know how to use calculating machines properly and how to execute the wide range of calculations which can be performed on them. Many short-cut methods have been developed by experienced computers and they have found their way into engineering know-how through articles in various technical publications. Relatively few American engineers, however, are familiar with the coordinate method of area computation described in this article. Once its simple principles are understood it enables the computer to do his work in a fraction of the time he would need for any other method and it helps him to avoid embarrassing and costly mistakes.

The only method described in American surveying textbooks and taught in our engineering colleges for the computation of an area of a figure formed by straight lines (a polygon) is the double meridian distance method which consists of many separate calculations, the results of which have to be written down and used again to obtain the final result. This procedure is tedious and time-consuming and contains many sources of possible mistakes.

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THE COORDINATE METHOD

The coordinate method, though based on the same basic formula as the DMD method, utilizes the given data in such a manner that only the final result, the area of the given polygon, has to be recorded. The calculating machine does as much of the computer's work as it possibly can and relieves him of all the unnecessary and superfluous intermediate calculations. Furthermore, the result can be checked independently and the computer can thus be assured that his work is completely free of mistakes.

The theoretical formulas used in the coordinate method are the following:

$$2A = \sum_{k=1}^{k=n} (X_{k+1} - X_{k-1})\, Y_k \qquad (1)$$

$$2A = -\sum_{k=1}^{k=n} (Y_{k+1} - Y_{k-1})\, X_k \qquad (2)$$

in which

A is the required area,

X and Y are the coordinates of the corners of the polygon forming the area,

n is the number of corners of the polygon,

X_k and Y_k are the coordinates of the k^{th} corner of the polygon,

X_{k-1} and Y_{k-1} are the coordinates of the corner preceding it, and

X_{k+1} and Y_{k+1} are the coordinates of the corner following it.

The area is computed as half the sum of n products formed in the manner shown in formulas 1 and 2. Each product in formula 1 is formed by multiplying the Y of each

point by the difference between the X of the following point and the X of the preceding point. The products in formula 2 are formed in a similar manner, reversing the position of the X's and Y's.

The key to the coordinate method is the way in which all these separate calculations are combined into one operation. The table and the step-by-step analysis of the method using the points listed will explain its application to a specific problem: determining the area of the polygon shown in the figure.

Step 1.—List all points forming the corners of the polygon, one underneath the other, with their coordinates, X-values (east or west) in the first column, Y-values (north or south) in the second column, as shown in the table. Com-

Table of Coordinate Values

Point	X (East)	Y (North)
A	5270.26	2769.76
B	5270.46	2433.63
C	4733.04	2348.32
D	4240.41	2136.47
E	5061.25	1371.55
F	2966.64	1141.43
G	2948.33	1180.22
H	2761.27	2354.61
I	4025.98	2541.72
J	3832.71	3847.96
K	5396.07	4169.18
L	5563.61	3836.29
M	5445.44	3577.17
N	7213.34	2770.89
A	5270.26	2769.76
A	5270.26	2769.76

puters accustomed to listing Y-values first can also do so when using the coordinate method; the reversed listing of the coordinates will only affect the position of the change lever (also called counter-control key) on the calculating machine. Any of the corners of the polygon can be used as the starting point, and the direction around the polygon can be either clockwise or counterclockwise. Since the coordinate method can only be used for figures with an odd number of sides, a polygon with an even number of sides has to be converted into one with an odd number by the simple expedient of listing one point in two consecutive lines in the table. The first point has to be listed again after we have arrived at the end of the list; thus the total number of lines will always be even. It is of the utmost importance that all coordinates listed be correct and that all points be listed in their proper sequence; once the list of points and their coordinates is complete and correct the computer can be certain that the final result of his computations will be correct.

Step 2.—Set the decimal points on the machine. The number of decimals on the keyboard and on the counter or multiplier dials (upper dials on Monroe and Marchant machines, lower dials on Friden machines) will be the same as that of the coordinates, usually two. The decimals in the product dials (middle dials on Marchant and on Monroe machines with full automatic multiplication, lower dials on other Monroe machines, upper dials on Friden machines) will be twice that number, usually four. If the coordinates have three decimal places, the numbers will be three and six respectively.

The change lever or counter-control key regulating the direction in which the counter dials rotate has to be set now according to the rules given below; whether the final result will be expressed as a positive or a negative number (commonly but incorrectly called "reciprocal") will depend on its position. It must not be changed during the entire calculation.

Step 3.—The X-value of the first point on the list is set on the multiplier dials (counter dials) by depressing the multiplying bar; since there is nothing set on the keyboard, the product dials will show only zeros. For the example in the table, the value to enter on the counter dials is 5270.26.

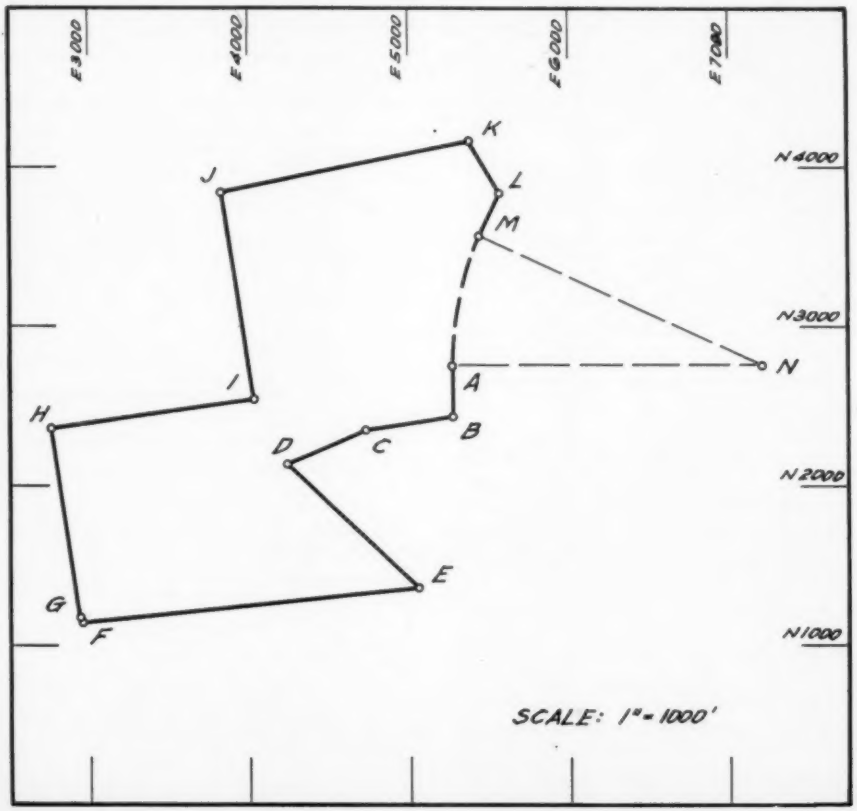
Step 4.—Set the Y-value of the second point on the list (2433.63 in the example) on the keyboard and then change the value in the counter dials by appropriate positive or negative multiplication to the X-value of the third point (4733.04 in the example).

Step 5.—Clear the keyboard only; then set the Y-value of the next point (2136.47) on the keyboard and again change the value in the counter dials to the X-value of the point next below (5061.25), as in step 4. Then proceed through all the points zigzagging down from the X of one point to the Y of the next one and then to the X of the one below. After having arrived at the last point at the end of the list, its Y-value (2769.76 in the example) will be in the keyboard. As the first point was listed again at the end of the list, the same Y-value is also listed in the first line. Change the value in the counter

dials to the X-value of the second point (5270.46), then set the Y-value of the third point (2348.32) on the keyboard, change the counter dials to the X-value of the fourth point (4240.41) and again proceed in the same manner down the list to its end. The X-value of the last point (5270.26) will finally again appear in the counter dials and the calculations are completed. The product dials show twice the area in square feet, if the coordinates are in feet. The value to appear in the product dials for the example is 10,547,035.3977. If the area is to be expressed in acres, divide the final result by 2 times 43,560 (87,120) without even writing the square foot value down.

MEANING OF NEGATIVE NUMBERS

It will be noted that neither the counter dials nor the product dials are cleared during the entire calculation. Another thing the computer has to be aware of is the appearance of negative numbers in the product dials either as an intermediate result or as the final result. Since the coordinate method actually consists of accumulating positive and negative products, that can not be avoided. Negative numbers appear as a series of figures preceded by several nines. For instance, a negative 12 will be shown as 99 . . . 9988, a negative 528 as 99 . . . 99472, etc. When an intermediate result is negative, proceed in the usual manner; on machines that do not have a complete capacity carry-over (Marchant machines are equipped with this feature) care must be taken, however, that the nines indicating the negative number extend all the way to the left



end of the product dials. That can be accomplished by changing from the positive number to the negative one with the carriage of the calculating machine as far to the right as possible. Likewise, when changing from a negative number back to a positive number, no nines must be left at the left end of the product dials.

If the final result appears as a negative number, the only thing that can be done is to convert it into a positive number on paper. The final result for the example expressed as a negative number would appear in the product dials as 99 . . . 9,989,452,964.6023.

The following rules for setting the change lever or counter-control key will have to be applied by the computer who wants to avoid negative results:

The final result will be positive, if
(1) *X*-values are positive or east coordinates,
(2) *Y*-values are positive or north coordinates,
(3) *X*-values are listed in the lefthand column, *Y*-values in the righthand column,
(4) The points are listed going around the polygon in a clockwise direction,
(5) The change level (counter-control key) is in the positive position; on the Marchant and Friden machines it will be in the upper position, on the Monroe machines it will be at "x,"
(6) The calculations in step 3 are started with the coordinate value of the first point that is listed in the lefthand column.

If any one of these six conditions is not as listed, the final result will be negative; if two of them are different the result will be positive, and so on.

Thus, for example, if the polygon whose area is to be computed is in the northwest quadrant of a coordinate system, the coordinates are listed with the westings first and the northings second, the direction of listing is counterclockwise and the computations are started in the upper right hand corner of the list. In other words, conditions 1, 4, and 6 are not as listed above and we can expect to get a negative final result. To avoid this, condition 5 is also changed by putting the change lever into its negative position (lower position on Marchant and Friden machines, at "÷" on Monroe machines). Since four conditions are not as listed, the result will be positive.

CHECKING THE COMPUTATIONS

It has been indicated that it is very easy to check the area computations by a reliable method. That is done by using formula 2; simply repeat the whole procedure, starting this time at the upper right corner of the list; what it actually means is using the *Y*-values on the counter dials and the *X*-values on the keyboard. As condition 6 on the above list is changed, a negative result can be expected unless the position of the change lever is also changed. The minus sign in formula 2 is the mathematical expression of the fact that a negative answer can be expected as the final result.

There can be no doubt that computing the area twice, once starting with the *X*-value of the first point in the counter dials, the second time with the *Y*-value, constitutes a thorough check. The final result must be exactly the same for both calculations, to the last decimal digit.

Computers who list *Y*-values in the first column and *X*-values in the second column are changing condition 3 on the list; if they want to get a positive answer, they must change the position of the change lever, provided the other points are not changed. The above rules for setting the change lever cover all possible variations of listing the coordinates and computing.

AREAS OF FIGURES WITH CURVED SIDES

Another advantage of the coordinate method is the ease with which the area of a figure bounded by straight lines and circular arcs can be computed. The procedure is as follows:

List all the points of the outline polygon as before, but also include the center points of the sides formed by circular arcs, listing them between the PC's and the PT's of the curve. In the example in the table, point *M* is the PC, point *N* the center point, and point *A* the PT of a circular curve indicated by the dashed line in the figure. If the area of the figure formed by all the listed points is computed as before, it will not be the area of the figure having the curved sides. The area or areas of the remaining circular sectors have to be computed separately using the formulas of plane geometry and they

have to be added to, or subtracted from, the area obtained by the coordinate method.

In the example, the radius of the circular curve is 1943.08 feet and the central angle is 24° 32′ 58″ or 88378″. The double area of the sector *MNA* is 1,617,709.0 square feet and has to be subtracted from the original double area. To compute the final area we have

$\frac{1}{2} \times$ 10,547,035.4 square feet (total area)
$-\frac{1}{2} \times$ 1,617,709.0 " " (circular sector)

$\frac{1}{2} \times$ 8,929,326.4 square feet (net area).

If the last figure is divided by 2 or 87,120, respectively, the result is 4,464,663.2 square feet or 102.495 acres as the area of the figure listed in the table, taking into consideration the fact that *MA* is a circular arc, point *N* its center point, all other lines are straight lines.

The coordinate method of area computation is only one of the many short-cut methods which permit the full use of the calculating machine for surveying computations. It certainly is desirable that these methods be collected, published, and made available to all surveyors, engineers, and engineering students.

From *The Australian Surveyor*

THE March 1953 issue of this publication devoted to the interests of the surveying profession of Australia, indicates that "The past year was most significant in the history of surveying in Australia, as it saw in operation for the first time, the [federal] Institution of Surveyors, Australia."

Typical of the various annual reports in this issue, we quote: "The Council has pleasure in presenting to you the Annual Report for the year 1952, but not without a slight tinge of regret, because this will be the last report on the South Australian Institute of Surveyors, as, in future, our Organization will be known as the 'Adelaide Division of the Institution of Surveyors, Australia.' The Institute completed its 70th year, and has a grand record of service to the profession of which it can be proud. To the Institution of Surveyors, Australia, go our best wishes and we pledge the undying support of our new Division to the Mother Body."

Other recent developments in Australian surveying are reported as follows:

It seems likely that the long-looked-for University degree course in surveying [in New South Wales] will shortly commence.

Shortly the surveys for permanent marking under the Survey Co-Ordination Act will commence.

Due to the interest displayed by the local press and national [radio] stations in the profession, our status in public opinion is much higher than in the past.

Further reading indicates that Australian surveyors have problems much akin to surveyor problems the world over—adequate fees, subdivision rules and regulations, ethical practice, and so on. May we then, as brothers all, wish continued success to the brothers down under.

W. S. DIX
Executive Secretary, ACSM

New 1954 Gurley Ephemeris

THE pocket-size edition of the Gurley Ephemeris, including a new chart of Polaris which makes possible an observation of the star within a minute—and with minimum computation—is now available from W. & L. E. Gurley, Troy, N. Y.

The new edition again includes an Almanac, listing 28 stars selected by cadastral engineers of the Bureau of Land Management, U. S. Department of the Interior. It gives complete instruction for determining azimuths by methods similar to those used in observations of the sun and Polaris.

The 100-page booklet also contains charts for the sun and Polaris, as well as definitions of astronomical terms, many sample problems, and tables.

The Ephemeris will be sent free, upon request, to practicing surveyors and engineers and to instructors and students of surveying.

The International Boundary and Water Commission and the Rio Grande[1]

By FORREST DANIELL

THE TEXAS COMPANY, HOUSTON, TEX.

THERE are places along the United States-Mexican border where persons may live in one place and yet "move" from the United States to Mexico and vice versa. Trick or magic? No, the explanation lies in the fact that the Rio Grande shifts its bed and creates "bancos."[2] Under treaty with Mexico, sovereignty over these areas of land may be transferred from one nation to the other.

The creation of bancos has resulted in rulings concerning the property rights and citizenship of persons who live in these areas. The main purpose of this article is to describe the problems relating to the elimination of bancos and to the functions of the International Boundary and Water Commission, United States and Mexico, in handling these matters. The origins and reasons for the actions of the Commission are described only when necessary to explain its functions. Likewise, the history and provisions of the various Conventions and of the original Treaty that established the Commission are discussed sketchily to provide needed explanations. In general, an effort has been made to bring up to date the facts and figures concerning the Commission and its activities.

NATURE OF THE BOUNDARY

The common boundary of the United States of America and of the United Mexican States is nearly 2,000 miles long, of which 1,241.4 miles follow the Rio Grande between the Gulf of Mexico and a point near El Paso, Tex.

When the boundary line was first surveyed and marked in accordance with the provisions of the Conventions of 1848 and 1853, it ran through territories inhabited by few persons except at isolated points. Since then, however, large areas have been developed for agricultural, mining, commercial, and industrial purposes. The development of irrigated farms, mines, and oil fields makes it highly essential that the Federal and local governments concerned and the residents of the area know the proper location of the boundary lines.

The Rio Grande flows through an alluvial valley, especially in its lower reaches, and carries and deposits large quantities of silt. Violent and destructive floods often characterize this river. As a consequence, it meanders frequently and widely over its flood plains. Its action is both accretive (increasing or extending the boundaries of land by deposit of alluvium) and avulsive (removal of land from one estate to another by means of a sudden change in the course of a river, with the property in the part thus segregated continuing in the ownership of the original owner). Except when its bank and bed are composed of rock, or when its bank is artificially confined, the river is constantly changing, not

[1] Reference is made to the pamphlet, "International Boundary Commission, United States and Mexico," by Charles A. Timm, published by the University of Texas, Austin, as Bulletin 4134, September 8, 1941. It is a significant study and a complete discussion of the various conventions between the United States and Mexico entered into prior to 1941, the creation of the Commission, its history, work, and powers, especially as to "bancos" along the Rio Grande.

[2] Banco: a portion of the flood plain or channel of a river cut off by the shifting of the course of the river. In particular, the term banco is applied in this article to land along an international boundary remaining under the jurisdiction of the country from which it has been separated. "Elimination of bancos" means, in effect, transfer of sovereignty over the land affected.

Photo by Chas. Holbrook

Aerial view of a banco formed during the flood of September 1948 opposite Rio Grande City, Tex., which is shown in the upper right quarter of the picture. Jurisdiction over this area passed to Mexico.

only its course, but also the elevation of its bed.

THE COMMISSION

The International Boundary and Water Commission, formerly the International Boundary Commission, was provided for by the Treaty of 1889 for the express purpose of administering the Treaty of 1884. The Treaty of 1884 established the water boundary between the United States and Mexico, formed by the Rio Grande and the Colorado Rivers, according to the commonly accepted principle that the boundary would follow the continuous deepest channel so long as movements of the river channel were caused by erosion and accretion. If the channel moved by avulsion, the boundary remained in the old river bed.

The frequency of avulsive changes in the boundary river was so great that the 1884 Treaty provision in this respect proved unsatisfactory. Those conversant with the subject were convinced that the only feasible solution would be an arrangement for the transfer of sovereignty over the areas cut off by avulsive changes in order to maintain the river as the boundary line. As a result, the Convention of 1905, which provided for the elimination of bancos, was signed and ratified. The commission was given responsibility for the administration of this Convention.

Other treaties that directly confer powers and duties upon the Commission are: The convention of 1906, which provides for equitable distribution of the waters of the Rio Grande above Fort Quitman, Tex.; the Convention of 1933, authorizing the rectification of the Rio Grande from near El Paso to Fort Quitman; and the Treaty of 1944, dividing the waters of the Colorado

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and the Tijuana Rivers and of the Rio Grande between the United States and Mexico, and providing for the necessary conservation works to utilize these waters. In addition, the Commission has succeeded to the functions of surveying and marking the boundary between the two countries.

The joint Commission consists of a United States Section and a Mexican Section, each headed by an engineer-commissioner. Its permanent headquarters are in El Paso, Texas, and Ciudad Juarez, Chihuahua, respectively.

Although the Commission does not arbitrate as does a tribunal, it does render decisions on many classes of boundary problems. The Commission has authority to hold meetings, to assemble papers containing information on boundary matters, to summon witnesses, and to take testimony. Except when the specific approval of the two governments is required, decisions of the Commission are considered approved by each of the governments unless disapproved within 30 days of the date they are rendered (it is interesting to note that few decisions have been challenged by either government).

The jurisdiction of the Commission extends to the limitrophe[3] parts of the Rio Grande and the Colorado Rivers, to the land boundary of the United States and Mexico, and to the works located upon their common boundary. Each Section of the Commission retains jurisdiction over that part of the works which is located within the limits of its own country.

Besides the function of demarcating and monumenting the land boundary and settling questions and differences which arise along the water boundary between the two countries, the Commission also is empowered to make studies and investigations, to prepare plans for and to construct flood-control works. These works include river levees, floodways, grade-control structures, and rectification and channelization of the boundary rivers. Such works are authorized by treaty and domestic law of the United States.

Furthermore, the Treaty of 1944 authorized the construction of international storage dams on the Rio Grande with the necessary diversion dams, flood-control works on the Lower Colorado River, and, in the future, conservation works on the Tijuana River. This Treaty also charged the Commission with the responsibility of administering the division of the international waters of the two countries. In addition, it provided that the works to be constructed should not produce any change in the fluvial international boundary, which shall continue to be governed by previous treaties and conventions that are in force between the United States and Mexico. Although this treaty gave the Commission power to enlarge the scope of its operations, it did not abridge any of the duties, powers, and operations assigned to it by previous treaties and agreements.

DEFINITION OF THE BOUNDARY

Under the Treaties of 1848 and 1853, the water boundary along the Rio Grande follows the deepest channel. Under the Treaty of 1884, the boundary remained the same as described in the Treaties of 1848 and 1853, notwithstanding any alterations in the course of the river, provided that such alterations are effected by erosion and accretion. However, if the river abandoned an existing bed, and opened a new one, the boundary was to remain in the old channel.

Besides authorizing administration of the Treaty of 1884, the Treaty of 1889 also empowered the Commission to deal with artificial changes in the beds of the Rio Grande and the Colorado River. As a result, the Commission was given authority to ascertain whether land along the river boundaries was segregated through either accretive or avulsive action, to determine the cause or causes thereof, and to apply the provisions of the Treaty of 1884 in determining sovereignty over such segregated land. Under provisions of the Treaty of 1889, the Commission was allowed to suspend the construction of artificial works which alter the course of the river.

[3] Limitrophe: in connection with, or pertaining to, limits.

CONVENTION OF 1905

When confronted with the practical difficulties of applying the provisions of the 1884 Treaty under the authority granted by the Treaty of 1889, the Commission proposed that both governments empower it to perform a new function, that of permanently settling the question of certain parcels of land known as bancos.

In order to meet these difficulties, a Convention was approved in 1905. It defined bancos[4] so that their disposal could be settled by the Commission. This convention defined bancos as being the result of a "typical class of changes effected in the bed of the Rio Grande, in which, owing to slow and gradual erosion, coupled with avulsion, said river abandons its old channel and there are separated from it small portions of land as 'bancos' bounded by the said old bed, and which, according to the terms of Article II of the . . . Convention of 1884, remain subject to the dominion and jurisdiction of the country from which they have been separated. . . ." As to dominion and jurisdiction over bancos, the 1884 Convention provided that ". . . so many of the . . . bancos as may remain on the right bank . . . shall pass to Mexico . . . and those . . . which remain on the left bank shall pass to the United States of America." Thus, the bancos, being the result of avulsive changes, would remain, according to this Convention, on the side of the boundary on which their areas formerly lay. As a result, in a river valley where this type of change is frequent, the river would, after a time, cease to be a boundary in fact along much of its course except at its intersections, and the boundary would be composed largely of artificial lines around the bancos.

Thus, the foregoing rules and decisions laid the groundwork for an important phase of the Commission's work—that of eliminating bancos from the effects of Article II of the Convention of 1884 and the disposition of bancos under the provisions of the Convention of 1905, drafted specifically for the latter purpose.

This latter convention also ordered that the Commission be guided in the future by what it called "the principle of elimination of bancos" with regard to the "labors concerning the boundary" throughout the Rio Grande-Colorado River boundary area. Excepted from this provision were the "portions of land segregated by the change in the bed of said rivers . . . having an area of over 250 hectares (1 hectare = 2.47 acres) or a population of over 200 souls and which shall not be considered as bancos for the purposes of this Treaty and shall not be eliminated, the bed of the river remaining, therefore, the boundary. . . ."

The Commission also was given instructions in the 1905 Convention as to how it was to deal with bancos that might be formed in the future. Article III directed not only that maps be prepared of such bancos, but ordered the Commission "to mark on the ground, with suitable monuments" the bed abandoned by the river "so that the boundaries of the bancos shall be clearly defined." In addition, it specified that the Commission was to "unite, by means of a straight line" all segregated land on which successive alluvium deposits caused disappearance of parts of the channel that were adjacent to the river and the nearest part of the bank of the same river.

RIGHTS OF BANCO RESIDENTS

As the number of inhabitants of bancos increased, it became increasingly necessary to establish their property and citizenship rights. Article IV of the 1905 Convention therefore gave citizens of either the United States or Mexico "who shall in future" be located on the land of the other country, the right to either remain on such land or to move "at any time, to whatever place may suit them" and either keep the property

[4] In meandering, the Rio Grande forms a banco by looping and gradually doubling back on itself, and, by erosion, continually reducing the neck of land contained in the loop. In the last stages of this erosion, the river either opens a new channel across overflowed land, or it caves in the land that constitutes the neck and finally cuts through, forming a new channel. The effect is to leave the territory within the limits of the oxbow on the opposite side of the river from where it was originally.

they possess or to dispose of it. Those preferring to remain on the eliminated bancos "may either preserve the title and rights of citizenship of the country to which the said bancos formerly belonged, or acquire the nationality of the country to which they will belong" in the future. The Article also stated that all kinds of property on eliminated bancos "shall be inviolably respected, and its present owners, their heirs, and those who may subsequently own the property legally" shall enjoy "as complete security as if these properties belonged to citizens of the country" in which the eliminated bancos are situated.

ELIMINATION OF BANCOS

In an effort to resolve some of the difficulties relating to the elimination of bancos, the Commission met on December 6, 1907, and agreed that the engineers' report should contain, as fully as possible, the following information:

(1) Indications as to whether the change was avulsive or acretive, together with reasons.

(2) Reference to such points on the map as would make for full understanding of the map.

The Commission also decided that maps of bancos should be prepared so as to show:

(1) The land in question, the present channel, abandoned channel, and any former channels that might be platted clearly from the records of the Commission.

(2) All houses, public roads, common highways, canals, fields, and such revelant features in order to fix the location in mind.

(3) Traverse lines and monument points, banks of the river, lines, and the width of the normal channel.

The Commission further ruled that all maps should be drawn at the scale of 1:5,000 and that a general map for each banco district should be prepared on a scale of 1:25,000. It also resolved that each banco be numbered by the commissioners after the Commission had examined and approved maps and reports of the engineers.

Whenever a banco is to be eliminated, the commissioners go to the location and observe the indications of change of channel. Whenever contestants appear, the Commission holds hearings to take testimony. After the first few hearings had been held, it was apparent to the Commission that some interested persons might have "convenient" memories. As a consequence, the commissioners agreed that the best evidence on the elimination of bancos would be the report and maps of the joint consulting engineers, but that, when these were not conclusive, or when the engineers expressed doubt, the Commission would examine qualified witnesses. This agreement was made on December 6, 1907.

Following each hearing, the Commission transmits the minutes containing the testimony and the maps and report of the engineers to the two governments, in accordance with Article VIII of the treaty that established the Commission.

Immediately after a decision is rendered, the engineers are instructed to run a new traverse and to establish monuments on the banco. When they complete this work, they report again and the commissioners notify their respective governments that monuments have been established.

The action to eliminate the banco then is considered completed.

PROBLEMS IN ELIMINATING BANCOS

In the elimination of bancos, many problems have arisen with regard to the determination of data because many of these data have antedated the drafting of the treaty. One practical question concerned the provision contained in an early treaty that the boundary shall "follow the center of the normal channel of the river." No difficulty was encountered with well-defined banks, but when only one or neither bank could be determined, a decision was difficult to render.

As a consequence, the Commission, at its meeting on December 6, 1907, ruled that when there is only one "live" bank, the average width of the river shall be determined by taking its average width (both upstream and donwnstream) where it flows in comparatively well-defined banks, and that the boundary shall be determined by measuring half of the distance of this average width from the "live" bank. When it finds that neither bank is "live," the Com-

mission decides that the boundary line shall follow the center of the deepest channel and that the banks shall be determined by measuring half of the assumed width from this center.

TOPOGRAPHIC EVIDENCE

The fact that a great mass of data regarding the various bancos has accumulated also has given rise to problems. For example, topographic evidence almost invariably needs to be corroborated. An interesting sidelight on this fact bears relating. In 1910, engineers observed that when a banco was formed, landowners frequently built fences in the middle of the old river bed, using cottonwoods for fenceposts. These posts took root and grew, forming a row of trees along the boundary. Of course, when other materials were used for posts, results were not so gratifying. The point of this illustration is the fact that these planted cottonwoods helped engineers when they surveyed many of the original 58 bancos.

The most novel and interesting of these fence-building activities was disclosed during the survey of 1909 on La Isla Banco No. 8, in the Lower Valley. Here the river had cut into the old bed in such a manner as to reveal three fences, on top of each other, the lower two having been successively buried by deposits from overflows.

Whenever the old bed or channel of the river could be plainly seen, little difficulty was encountered in establishing the traverse. This often was not true, however, especially when the survey was made several years after the cut had been made. In such circumstances, the locations and age of trees and other vegetation were often used to help establish the fact of avulsion and the location of the old bed.

Another method of more fully ascertaining the extent and locations of avulsive changes has been to refer to previous surveys. An example is the fact that, in order to determine bends in the old channel, engineers in 1897–98 often referred to the work of Emory and Salazar, performed in 1852. In 1908, engineers referred to the survey of 1852 and that of 1897–98. All three of these surveys were used to establish the true topographic outline when the same region was surveyed for bancos of the second series. Also, the 1913 survey of the Presidio Valley by the consulting engineers served as a basis for the 1930 observations.

Although the aforementioned method of checking often admittedly complicates the work of the engineers, it nevertheless assists them in accurately determining the locations of former river channels.

Very few difficult problems have been encountered in proceedings to eliminate bancos, in spite of the limitations imposed by Article II of the 1905 Treaty; to wit: The excepting from elimination of any tract with an area of more than 250 hectares or a population of more than 200 persons, the former bed of the river remaining as the boundary. It is pointed out that the size of the true banco seldom exceeds 250 hectares and the population usually is fewer than 20 persons.

By the precedent established in its disposition of Camp Rice Banco, the Commission was enabled to rule that the area of a banco at the time of the avulsive change or at the time of the earliest survey thereafter shall obtain with regard to the treaty limitation as to size.

TEXAS JURISDICTION OVER BANCOS

In connection with acceptance by the two governments of the idea that the Commission has the power to award bancos, the legislative view seems worthy of note.

In 1922, the Congress of the United States passed an act that handed to the jurisdiction of Texas all banco lands contiguous to her territory, contingent upon acceptance of the law by Texas. The Act of the Texas Legislature accepting such areas into the State's territory and jurisdiction provided that "the boundary lines of said bancos . . . shall be accepted as the true boundaries." The act also declared that it "shall also be the duty of the county surveyors of all counties . . . within whose boundaries said lands or bancos shall lie," to report "to their tax assessors the quantity of lands thus acquired . . . within ninety days after the . . . Committee (*sic*) shall

proclaim that said bancos have become American territory."

CONCLUSION

Since the treaty for eliminating the bancos was adopted, the Commission has eliminated some 218 bancos. Records show that most of these have been awarded to the United States. Mexico has gained some 3,900 hectares of land in contrast to the approximately 7,100 hectares gained by the United States

This disparity between the total areas cut to the two countries and eliminated as bancos probably is largely the result of the wanderings of the Rio Grande. Because lands on the United States side generally have been of greater value than have those of Mexico, the early banco cuts to the United States were more likely to be called to the attention of the Commission than were those cut to Mexico. Since 1940, the areas have been almost equal. Because the stream is subjected to more close surveillance nowadays than formerly, the Commission now takes action on all bancos.

Despite past difficulties in applying the convention for the elimination of the bancos, both the United States and Mexico are believed to have been satisfied with the results.

In the future, bancos seldom will be formed because some flood-control works already have been constructed and others are under construction.

The Rectification Project has stabilized the stretch of the Rio Grande through the El Paso-Juarez Valley. The velocity of the current and the rocky terrain in the canyon section of the Rio Grande make the formation of bancos there unlikely. The absence of large floods of the Rio

Photo by Brad H. Smith

Falcon Dam and spillway as viewed from an altitude of 400 feet just downstream from the dam on the American side looking toward the Mexican side.

Grande throughout the Presidio Valley has tended to reduce avulsive cuts and resulted in the formation of fewer new bancos.

On October 19, 1953, President Eisenhower and Mexico's President Adolfo Ruiz Cortines jointly dedicated the 50-million-dollar Falcon Dam, thus solemnizing a tremendous cooperative achievement between Mexico and the United States. The dam, which takes its name from the 150-year-old village of Falcon, now inundated, is 5 miles long and spans the Rio Grande a short distance downstream from the Starr-Zapata County line in Texas. Falcon Dam is the first of a series of dams to be built across the Rio Grande in accordance with the water treaty of 1944. It marks a major step forward in the solution of problems of the international boundary between the United States and Mexico.

Wallace & Tiernan—Novadel-Agene Merger Announced

On January 1, 1954, the merger of the associated companies, Wallace and Tiernan Co., Inc., and Novadel-Agene Corporation, into a single organization known as Wallace & Tiernan Incorporated was completed. Stock of the new company is listed on the American Stock Exchange. Subsidiaries include W. C. Hardesty Co., Inc., Richmond Manufacturing Company, Thompson Machine Co., Electro Rust-Proofing Corporation (N. J.) and Wallace and Tiernan Ltd.

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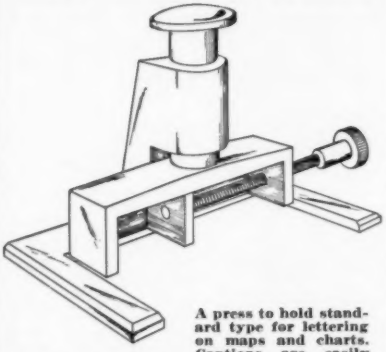

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Grade Correction Table

By HOWARD S. RAPPLEYE

U. S. COAST AND GEODETIC SURVEY (RET.)

IN PRECISE TAPING, with tapes graduated in 100 units and differences in elevation between the tape ends determined in the same units, the following table may be used to determine the grade or slope corrections.

For example, assume that a 100-foot tape was used between stakes or bucks having a difference of elevation (h) of 12.436 feet. The grade correction (C_g) is then

$$C_g = 0.7755 + (0.6 \times 0.0013) \text{ or } 0.7763 \text{ feet.}$$

Grade corrections are, of course, always negative in sign.

To keep grade corrections accurate to four decimal places it is necessary to determine differences of elevation greater than about 1 foot to three decimal places. If the grade corrections are only carried to three decimal places, then h may be determined to only two decimal places up to a maximum h of about 5.00 feet.

h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
0.00	0.0000	0.50	0.0012	1.00	0.0050	1.50	0.0113	2.00	0.0200
1	0	1	13	1	51	1	114	1	202
2	0	2	14	2	52	2	116	2	204
3	0	3	14	3	53	3	117	3	206
4	0	4	15	4	54	4	119	4	208
5	0	5	15	5	55	5	120	5	210
6	0	6	16	6	56	6	122	6	212
7	0	7	16	7	57	7	123	7	214
8	0	8	17	8	58	8	125	8	216
9	0	9	17	9	59	9	126	9	218
0.10	0.0000	0.60	0.0018	1.10	0.0060	1.60	0.0128	2.10	0.0221
1	1	1	19	1	62	1	130	1	223
2	1	2	19	2	63	2	131	2	225
3	1	3	20	3	64	3	133	3	227
4	1	4	20	4	65	4	134	4	229
5	1	5	21	5	66	5	136	5	231
6	1	6	22	6	67	6	138	6	233
7	1	7	22	7	68	7	139	7	235
8	2	8	23	8	70	8	141	8	238
9	2	9	24	9	71	9	143	9	240
0.20	0.0002	0.70	0.0024	1.20	0.0072	1.70	0.0145	2.20	0.0242
1	2	1	25	1	73	1	146	1	244
2	2	2	26	2	74	2	148	2	246
3	3	3	27	3	76	3	150	3	249
4	3	4	27	4	77	4	151	4	251
5	3	5	28	5	78	5	153	5	253
6	3	6	29	6	79	6	155	6	255
7	4	7	30	7	81	7	157	7	258
8	4	8	30	8	82	8	158	8	260
9	4	9	31	9	83	9	160	9	262
0.30	0.0004	0.80	0.0032	1.30	0.0085	1.80	0.0162	2.30	0.0265
1	5	1	33	1	86	1	164	1	267
2	5	2	34	2	87	2	166	2	269
3	5	3	34	3	88	3	167	3	271
4	6	4	35	4	90	4	169	4	274
5	6	5	36	5	91	5	171	5	276
6	6	6	37	6	92	6	173	6	279
7	7	7	38	7	94	7	175	7	281
8	7	8	39	8	95	8	177	8	283
9	8	9	40	9	97	9	179	9	286
0.40	0.0008	0.90	0.0040	1.40	0.0098	1.90	0.0181	2.40	0.0288
1	8	1	41	1	99	1	182	1	290
2	9	2	42	2	0.0101	2	184	2	293
3	9	3	43	3	102	3	186	3	295
4	10	4	44	4	104	4	188	4	298
5	10	5	45	5	105	5	190	5	300
6	11	6	46	6	107	6	192	6	303
7	11	7	47	7	108	7	194	7	305
8	12	8	48	8	110	8	196	8	308
9	12	9	49	9	111	9	198	9	310
0.50	0.0012	1.00	0.0050	1.50	0.0113	2.00	0.0200	2.50	0.0313

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h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
2.50	0.0313	3.30	0.0545	4.10	0.0841	4.90	0.1201	5.70	0.1626
1	315	1	548	1	845	1	1206	1	1632
2	318	2	551	2	849	2	1211	2	1637
3	320	3	555	3	853	3	1216	3	1643
4	323	4	558	4	857	4	1221	4	1649
5	325	5	561	5	861	5	1226	5	1654
6	328	6	565	6	866	6	1231	6	1660
7	330	7	568	7	870	7	1236	7	1666
8	333	8	571	8	874	8	1241	8	1672
9	335	9	575	9	878	9	1246	9	1678
2.60	0.0338	3.40	0.0578	4.20	0.0882	5.00	0.1251	5.80	0.1683
1	341	1	582	1	887	1	1256	1	1689
2	343	2	585	2	891	2	1261	2	1695
3	346	3	588	3	895	3	1266	3	1701
4	349	4	592	4	899	4	1271	4	1707
5	351	5	595	5	904	5	1276	5	1713
6	354	6	599	6	908	6	1281	6	1718
7	357	7	602	7	912	7	1286	7	1724
8	359	8	606	8	916	8	1291	8	1730
9	362	9	609	9	921	9	1296	9	1736
2.70	0.0365	3.50	0.0613	4.30	0.0925	5.10	0.1301	5.90	0.1742
1	367	1	616	1	929	1	1306	1	1748
2	370	2	620	2	934	2	1312	2	1754
3	373	3	623	3	938	3	1317	3	1760
4	375	4	627	4	942	4	1322	4	1766
5	378	5	630	5	947	5	1327	5	1772
6	381	6	634	6	951	6	1332	6	1778
7	384	7	637	7	955	7	1337	7	1784
8	386	8	641	8	960	8	1343	8	1790
9	389	9	645	9	964	9	1348	9	1796
2.80	0.0392	3.60	0.0648	4.40	0.0968	5.20	0.1353	6.00	0.1802
1	395	1	652	1	973	1	1358	1	1808
2	398	2	655	2	977	2	1363	2	1814
3	401	3	659	3	982	3	1369	3	1820
4	403	4	663	4	986	4	1374	4	1826
5	406	5	666	5	991	5	1379	5	1832
6	409	6	670	6	995	6	1384	6	1838
7	412	7	674	7	0.1000	7	1390	7	1844
8	415	8	677	8	1004	8	1395	8	1850
9	418	9	681	9	1009	9	1400	9	1856
2.90	0.0421	3.70	0.0685	4.50	0.1013	5.30	0.1405	6.10	0.1862
1	423	1	688	1	1018	1	1411	1	1868
2	426	2	692	2	1022	2	1416	2	1874
3	429	3	696	3	1027	3	1421	3	1881
4	432	4	700	4	1031	4	1427	4	1887
5	435	5	703	5	1036	5	1432	5	1893
6	438	6	707	6	1040	6	1438	6	1899
7	441	7	711	7	1045	7	1443	7	1905
8	444	8	715	8	1049	8	1448	8	1911
9	447	9	718	9	1054	9	1454	9	1918
3.00	0.0450	3.80	0.0722	4.60	0.1059	5.40	0.1459	6.20	0.1924
1	453	1	726	1	1063	1	1464	1	1930
2	456	2	730	2	1068	2	1470	2	1936
3	459	3	734	3	1072	3	1475	3	1943
4	462	4	738	4	1077	4	1481	4	1949
5	465	5	741	5	1082	5	1486	5	1955
6	468	6	745	6	1086	6	1492	6	1961
7	471	7	749	7	1091	7	1497	7	1968
8	474	8	753	8	1096	8	1503	8	1974
9	478	9	757	9	1100	9	1508	9	1980
3.10	0.0481	3.90	0.0761	4.70	0.1105	5.50	0.1514	6.30	0.1986
1	484	1	765	1	1110	1	1519	1	1993
2	487	2	769	2	1115	2	1525	2	1999
3	490	3	773	3	1119	3	1530	3	2005
4	493	4	776	4	1124	4	1536	4	2012
5	496	5	780	5	1129	5	1541	5	2018
6	499	6	784	6	1134	6	1547	6	2025
7	503	7	788	7	1138	7	1552	7	2031
8	506	8	792	8	1143	8	1558	8	2037
9	509	9	796	9	1148	9	1564	9	2044
3.20	0.0512	4.00	0.0800	4.80	0.1153	5.60	0.1569	6.40	0.2050
1	515	1	804	1	1157	1	1575	1	2057
2	519	2	808	2	1162	2	1580	2	2063
3	522	3	812	3	1167	3	1586	3	2069
4	525	4	816	4	1172	4	1592	4	2076
5	528	5	820	5	1177	5	1597	5	2082
6	532	6	825	6	1182	6	1603	6	2089
7	535	7	829	7	1187	7	1609	7	2095
8	538	8	833	8	1191	8	1614	8	2102
9	541	9	837	9	1196	9	1620	9	2108
3.30	0.0545	4.10	0.0841	4.90	0.1201	5.70	0.1626	6.50	0.2115

h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
6.50	0.2115	7.30	0.2668	8.10	0.3286	8.90	0.3968	9.70	0.4716
1	2121	1	2675	1	3294	1	3977	1	4725
2	2128	2	2683	2	3302	2	3986	2	4735
3	2134	3	2690	3	3310	3	3995	3	4745
4	2141	4	2697	4	3318	4	4004	4	4755
5	2147	5	2705	5	3327	5	4013	5	4764
6	2154	6	2712	6	3335	6	4022	6	4774
7	2161	7	2720	7	3343	7	4031	7	4784
8	2167	8	2727	8	3351	8	4040	8	4794
9	2174	9	2734	9	3359	9	4049	9	4804
6.60	0.2180	7.40	0.2742	8.20	0.3368	9.00	0.4058	9.80	0.4814
1	2187	1	2749	1	3376	1	4067	1	4823
2	2194	2	2757	2	3384	2	4076	2	4833
3	2200	3	2764	3	3392	3	4085	3	4843
4	2207	4	2772	4	3401	4	4094	4	4853
5	2214	5	2779	5	3409	5	4104	5	4863
6	2220	6	2786	6	3417	6	4113	6	4873
7	2227	7	2794	7	3426	7	4122	7	4883
8	2234	8	2801	8	3434	8	4131	8	4893
9	2240	9	2809	9	3442	9	4140	9	4903
6.70	0.2247	7.50	0.2816	8.30	0.3450	9.10	0.4149	9.90	0.4913
1	2254	1	2824	1	3459	1	4158	1	4923
2	2260	2	2832	2	3467	2	4167	2	4932
3	2267	3	2839	3	3475	3	4177	3	4942
4	2274	4	2847	4	3484	4	4186	4	4952
5	2281	5	2854	5	3492	5	4195	5	4962
6	2287	6	2862	6	3501	6	4204	6	4972
7	2294	7	2869	7	3509	7	4213	7	4982
8	2301	8	2877	8	3517	8	4223	8	4992
9	2308	9	2885	9	3526	9	4232	9	5003
6.80	0.2315	7.60	0.2892	8.40	0.3534	9.20	0.4241	10.00	0.5013
1	2322	1	2900	1	3543	1	4250	1	5023
2	2328	2	2907	2	3551	2	4259	2	5033
3	2335	3	2915	3	3560	3	4269	3	5043
4	2342	4	2923	4	3568	4	4278	4	5053
5	2349	5	2930	5	3577	5	4287	5	5063
6	2356	6	2938	6	3585	6	4297	6	5073
7	2363	7	2946	7	3593	7	4306	7	5083
8	2370	8	2953	8	3602	8	4315	8	5093
9	2376	9	2961	9	3611	9	4325	9	5103
6.90	0.2383	7.70	0.2969	8.50	0.3619	9.30	0.4334	10.10	0.5114
1	2390	1	2977	1	3628	1	4343	1	5124
2	2397	2	2984	2	3636	2	4353	2	5134
3	2404	3	2992	3	3645	3	4362	3	5144
4	2411	4	3000	4	3653	4	4371	4	5154
5	2418	5	3008	5	3662	5	4381	5	5164
6	2425	6	3015	6	3670	6	4390	6	5175
7	2432	7	3023	7	3679	7	4400	7	5185
8	2439	8	3031	8	3688	8	4409	8	5195
9	2446	9	3039	9	3696	9	4418	9	5205
7.00	0.2453	7.80	0.3047	8.60	0.3705	9.40	0.4428	10.20	0.5216
1	2460	1	3054	1	3714	1	4437	1	5226
2	2467	2	3062	2	3722	2	4447	2	5236
3	2474	3	3070	3	3731	3	4456	3	5246
4	2481	4	3078	4	3739	4	4466	4	5257
5	2488	5	3086	5	3748	5	4475	5	5267
6	2495	6	3094	6	3757	6	4485	6	5277
7	2502	7	3102	7	3766	7	4494	7	5288
8	2509	8	3110	8	3774	8	4504	8	5298
9	2517	9	3117	9	3783	9	4513	9	5308
7.10	0.2524	7.90	0.3125	8.70	0.3792	9.50	0.4523	10.30	0.5319
1	2531	1	3133	1	3800	1	4532	1	5329
2	2538	2	3141	2	3809	2	4542	2	5339
3	2545	3	3149	3	3818	3	4551	3	5350
4	2552	4	3157	4	3827	4	4561	4	5360
5	2559	5	3165	5	3835	5	4571	5	5371
6	2567	6	3173	6	3844	6	4580	6	5381
7	2574	7	3181	7	3853	7	4590	7	5391
8	2581	8	3189	8	3862	8	4599	8	5402
9	2588	9	3197	9	3871	9	4609	9	5412
7.20	0.2595	8.00	0.3205	8.80	0.3880	9.60	0.4619	10.40	0.5423
1	2603	1	3213	1	3888	1	4628	1	5433
2	2610	2	3221	2	3897	2	4638	2	5444
3	2617	3	3229	3	3906	3	4648	3	5454
4	2624	4	3237	4	3915	4	4657	4	5465
5	2632	5	3245	5	3924	5	4667	5	5475
6	2639	6	3253	6	3933	6	4677	6	5486
7	2646	7	3262	7	3942	7	4686	7	5496
8	2653	8	3270	8	3951	8	4696	8	5507
9	2661	9	3278	9	3959	9	4706	9	5517
7.30	0.2668	8.10	0.3286	8.90	0.3968	9.70	0.4716	10.50	0.5528

h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
10.50	0.5528	11.30	0.6405	12.10	0.7347	12.90	0.8355	13.70	0.9429
1	5538	1	6416	1	7360	1	8368	1	9443
2	5549	2	6428	2	7372	2	8381	2	9457
3	5560	3	6439	3	7384	3	8394	3	9470
4	5570	4	6451	4	7396	4	8408	4	9484
5	5581	5	6462	5	7409	5	8421	5	9498
6	5591	6	6473	6	7421	6	8434	6	9512
7	5602	7	6485	7	7433	7	8447	7	9526
8	5613	8	6496	8	7445	8	8460	8	9540
9	5623	9	6508	9	7458	9	8473	9	9554
10.60	0.5634	11.40	0.6519	12.20	0.7470	13.00	0.8486	13.80	0.9568
1	5645	1	6531	1	7482	1	8499	1	9582
2	5655	2	6542	2	7495	2	8512	2	9596
3	5666	3	6554	3	7507	3	8525	3	9610
4	5677	4	6565	4	7519	4	8539	4	9624
5	5687	5	6577	5	7531	5	8552	5	9638
6	5698	6	6588	6	7544	6	8565	6	9652
7	5709	7	6600	7	7556	7	8578	7	9666
8	5719	8	6611	8	7569	8	8591	8	9680
9	5730	9	6623	9	7581	9	8604	9	9694
10.70	0.5741	11.50	0.6635	12.30	0.7593	13.10	0.8618	13.90	0.9708
1	5752	1	6646	1	7606	1	8631	1	9722
2	5763	2	6658	2	7618	2	8644	2	9736
3	5773	3	6669	3	7631	3	8657	3	9750
4	5784	4	6681	4	7643	4	8671	4	9764
5	5795	5	6693	5	7655	5	8684	5	9778
6	5806	6	6704	6	7668	6	8697	6	9792
7	5817	7	6716	7	7680	7	8710	7	9806
8	5827	8	6727	8	7693	8	8724	8	9820
9	5838	9	6739	9	7705	9	8737	9	9834
10.80	0.5849	11.60	0.6751	12.40	0.7718	13.20	0.8750	14.00	0.9848
1	5860	1	6762	1	7730	1	8764	1	9863
2	5871	2	6774	2	7743	2	8777	2	9877
3	5882	3	6786	3	7755	3	8790	3	9891
4	5893	4	6798	4	7768	4	8804	4	9905
5	5904	5	6809	5	7780	5	8817	5	9919
6	5914	6	6821	6	7793	6	8830	6	9934
7	5925	7	6833	7	7806	7	8844	7	9948
8	5936	8	6845	8	7818	8	8857	8	9962
9	5947	9	6856	9	7831	9	8871	9	9976
10.90	0.5958	11.70	0.6868	12.50	0.7843	13.30	0.8884	14.10	0.9990
1	5969	1	6880	1	7856	1	8897	1	1.0005
2	5980	2	6892	2	7868	2	8911	2	1.0019
3	5991	3	6903	3	7881	3	8924	3	1.0033
4	6002	4	6915	4	7894	4	8938	4	1.0047
5	6013	5	6927	5	7906	5	8951	5	1.0062
6	6024	6	6939	6	7919	6	8965	6	1.0076
7	6035	7	6951	7	7932	7	8978	7	1.0090
8	6046	8	6963	8	7944	8	8992	8	1.0105
9	6057	9	6975	9	7957	9	9005	9	1.0119
11.00	0.6068	11.80	0.6986	12.60	0.7970	13.40	0.9019	14.20	1.0133
1	6079	1	6998	1	7982	1	9032	1	1.0148
2	6091	2	7010	2	7995	2	9046	2	1.0162
3	6102	3	7022	3	8008	3	9059	3	1.0176
4	6113	4	7034	4	8021	4	9073	4	1.0191
5	6124	5	7046	5	8033	5	9086	5	1.0205
6	6135	6	7058	6	8046	6	9100	6	1.0220
7	6146	7	7070	7	8059	7	9114	7	1.0234
8	6157	8	7082	8	8072	8	9127	8	1.0248
9	6168	9	7094	9	8084	9	9141	9	1.0263
11.10	0.6180	11.90	0.7106	12.70	0.8097	13.50	0.9154	14.30	1.0277
1	6191	1	7118	1	8110	1	9168	1	1.0292
2	6202	2	7130	2	8123	2	9182	2	1.0306
3	6213	3	7142	3	8136	3	9195	3	1.0321
4	6224	4	7154	4	8149	4	9209	4	1.0335
5	6236	5	7166	5	8161	5	9223	5	1.0350
6	6247	6	7178	6	8174	6	9236	6	1.0364
7	6258	7	7190	7	8187	7	9250	7	1.0379
8	6269	8	7202	8	8200	8	9264	8	1.0393
9	6281	9	7214	9	8213	9	9277	9	1.0408
11.20	0.6292	12.00	0.7226	12.80	0.8226	13.60	0.9291	14.40	1.0422
1	6303	1	7238	1	8239	1	9305	1	1.0437
2	6314	2	7250	2	8252	2	9319	2	1.0451
3	6326	3	7262	3	8265	3	9332	3	1.0466
4	6337	4	7275	4	8278	4	9346	4	1.0481
5	6348	5	7287	5	8290	5	9360	5	1.0495
6	6360	6	7299	6	8303	6	9374	6	1.0510
7	6371	7	7311	7	8316	7	9388	7	1.0524
8	6382	8	7323	8	8329	8	9401	8	1.0539
9	6394	9	7335	9	8342	9	9415	9	1.0554
11.30	0.6405	12.10	0.7347	12.90	0.8355	13.70	0.9429	14.50	1.0568

h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
14.50	1.0568	15.30	1.1774	16.10	1.3046	16.90	1.4384	17.70	1.5789
1	1.0583	1	1.1789	1	1.3062	1	1.4401	1	1.5807
2	1.0598	2	1.1805	2	1.3078	2	1.4418	2	1.5825
3	1.0612	3	1.1820	3	1.3095	3	1.4435	3	1.5843
4	1.0627	4	1.1836	4	1.3111	4	1.4453	4	1.5861
5	1.0642	5	1.1851	5	1.3127	5	1.4470	5	1.5879
6	1.0656	6	1.1867	6	1.3144	6	1.4487	6	1.5897
7	1.0671	7	1.1882	7	1.3160	7	1.4504	7	1.5915
8	1.0686	8	1.1898	8	1.3176	8	1.4521	8	1.5933
9	1.0701	9	1.1914	9	1.3193	9	1.4539	9	1.5951
14.60	1.0715	15.40	1.1929	16.20	1.3209	17.00	1.4556	17.80	1.5970
1	1.0730	1	1.1945	1	1.3226	1	1.4573	1	1.5988
2	1.0745	2	1.1960	2	1.3242	2	1.4590	2	1.6006
3	1.0760	3	1.1976	3	1.3259	3	1.4608	3	1.6024
4	1.0775	4	1.1992	4	1.3275	4	1.4625	4	1.6042
5	1.0789	5	1.2007	5	1.3291	5	1.4642	5	1.6060
6	1.0804	6	1.2023	6	1.3308	6	1.4660	6	1.6078
7	1.0819	7	1.2039	7	1.3324	7	1.4677	7	1.6096
8	1.0834	8	1.2054	8	1.3341	8	1.4694	8	1.6115
9	1.0849	9	1.2070	9	1.3357	9	1.4712	9	1.6133
14.70	1.0864	15.50	1.2086	16.30	1.3374	17.10	1.4729	17.90	1.6151
1	1.0878	1	1.2101	1	1.3390	1	1.4746	1	1.6169
2	1.0893	2	1.2117	2	1.3407	2	1.4764	2	1.6187
3	1.0908	3	1.2133	3	1.3424	3	1.4781	3	1.6206
4	1.0923	4	1.2148	4	1.3440	4	1.4798	4	1.6224
5	1.0938	5	1.2164	5	1.3457	5	1.4816	5	1.6242
6	1.0953	6	1.2180	6	1.3473	6	1.4833	6	1.6260
7	1.0968	7	1.2196	7	1.3490	7	1.4851	7	1.6279
8	1.0983	8	1.2211	8	1.3506	8	1.4868	8	1.6297
9	1.0998	9	1.2227	9	1.3523	9	1.4886	9	1.6315
14.80	1.1013	15.60	1.2243	16.40	1.3540	17.20	1.4903	18.00	1.6333
1	1.1028	1	1.2259	1	1.3556	1	1.4921	1	1.6352
2	1.1043	2	1.2275	2	1.3573	2	1.4938	2	1.6370
3	1.1058	3	1.2290	3	1.3590	3	1.4955	3	1.6388
4	1.1073	4	1.2306	4	1.3606	4	1.4973	4	1.6407
5	1.1088	5	1.2322	5	1.3623	5	1.4990	5	1.6425
6	1.1103	6	1.2338	6	1.3640	6	1.5008	6	1.6443
7	1.1118	7	1.2354	7	1.3656	7	1.5026	7	1.6462
8	1.1133	8	1.2370	8	1.3673	8	1.5043	8	1.6480
9	1.1148	9	1.2386	9	1.3690	9	1.5061	9	1.6499
14.90	1.1163	15.70	1.2401	16.50	1.3706	17.30	1.5078	18.10	1.6517
1	1.1178	1	1.2417	1	1.3723	1	1.5096	1	1.6535
2	1.1193	2	1.2433	2	1.3740	2	1.5113	2	1.6554
3	1.1208	3	1.2449	3	1.3757	3	1.5131	3	1.6572
4	1.1223	4	1.2465	4	1.3773	4	1.5149	4	1.6591
5	1.1238	5	1.2481	5	1.3790	5	1.5166	5	1.6609
6	1.1253	6	1.2497	6	1.3807	6	1.5184	6	1.6628
7	1.1269	7	1.2513	7	1.3824	7	1.5201	7	1.6646
8	1.1284	8	1.2529	8	1.3841	8	1.5219	8	1.6664
9	1.1299	9	1.2545	9	1.3857	9	1.5237	9	1.6683
15.00	1.1314	15.80	1.2561	16.60	1.3874	17.40	1.5254	18.20	1.6701
1	1.1329	1	1.2577	1	1.3891	1	1.5272	1	1.6720
2	1.1344	2	1.2593	2	1.3908	2	1.5290	2	1.6739
3	1.1360	3	1.2609	3	1.3925	3	1.5307	3	1.6757
4	1.1375	4	1.2625	4	1.3942	4	1.5325	4	1.6776
5	1.1390	5	1.2641	5	1.3959	5	1.5343	5	1.6794
6	1.1405	6	1.2657	6	1.3975	6	1.5361	6	1.6813
7	1.1420	7	1.2673	7	1.3992	7	1.5378	7	1.6831
8	1.1436	8	1.2689	8	1.4009	8	1.5396	8	1.6850
9	1.1451	9	1.2705	9	1.4026	9	1.5414	9	1.6868
15.10	1.1466	15.90	1.2721	16.70	1.4043	17.50	1.5432	18.30	1.6887
1	1.1482	1	1.2738	1	1.4060	1	1.5449	1	1.6906
2	1.1497	2	1.2754	2	1.4077	2	1.5467	2	1.6924
3	1.1512	3	1.2770	3	1.4094	3	1.5485	3	1.6943
4	1.1527	4	1.2786	4	1.4111	4	1.5503	4	1.6962
5	1.1543	5	1.2802	5	1.4128	5	1.5521	5	1.6980
6	1.1558	6	1.2818	6	1.4145	6	1.5538	6	1.6999
7	1.1573	7	1.2834	7	1.4162	7	1.5556	7	1.7018
8	1.1589	8	1.2851	8	1.4179	8	1.5574	8	1.7036
9	1.1604	9	1.2867	9	1.4196	9	1.5592	9	1.7055
15.20	1.1620	16.00	1.2883	16.80	1.4213	17.60	1.5610	18.40	1.7074
1	1.1635	1	1.2899	1	1.4230	1	1.5628	1	1.7092
2	1.1650	2	1.2915	2	1.4247	2	1.5646	2	1.7111
3	1.1666	3	1.2932	3	1.4264	3	1.5664	3	1.7130
4	1.1681	4	1.2948	4	1.4281	4	1.5681	4	1.7149
5	1.1697	5	1.2964	5	1.4298	5	1.5699	5	1.7167
6	1.1712	6	1.2980	6	1.4315	6	1.5717	6	1.7186
7	1.1727	7	1.2997	7	1.4333	7	1.5735	7	1.7205
8	1.1743	8	1.3013	8	1.4350	8	1.5753	8	1.7224
9	1.1758	9	1.3029	9	1.4367	9	1.5771	9	1.7243
15.30	1.1774	16.10	1.3046	16.90	1.4384	17.70	1.5789	18.50	1.7261

h	C_g	h	C_g	h	C_g	h	C_g	h	C_g
18.50	1.7261	18.80	1.7831	19.10	1.8410	19.40	1.8998	19.70	1.9596
1	1.7280	1	1.7850	1	1.8429	1	1.9018	1	1.9617
2	1.7299	2	1.7869	2	1.8449	2	1.9038	2	1.9637
3	1.7318	3	1.7888	3	1.8468	3	1.9058	3	1.9657
4	1.7337	4	1.7908	4	1.8488	4	1.9078	4	1.9677
5	1.7356	5	1.7927	5	1.8507	5	1.9097	5	1.9697
6	1.7375	6	1.7946	6	1.8527	6	1.9117	6	1.9717
7	1.7394	7	1.7965	7	1.8546	7	1.9137	7	1.9737
8	1.7412	8	1.7984	8	1.8566	8	1.9157	8	1.9758
9	1.7431	9	1.8004	9	1.8586	9	1.9177	9	1.9778
18.60	1.7450	18.90	1.8023	19.20	1.8605	19.50	1.9197	19.80	1.9798
1	1.7469	1	1.8042	1	1.8625	1	1.9217	1	1.9818
2	1.7488	2	1.8061	2	1.8644	2	1.9237	2	1.9838
3	1.7507	3	1.8081	3	1.8664	3	1.9256	3	1.9859
4	1.7526	4	1.8100	4	1.8683	4	1.9276	4	1.9879
5	1.7545	5	1.8119	5	1.8703	5	1.9296	5	1.9899
6	1.7564	6	1.8139	6	1.8723	6	1.9316	6	1.9919
7	1.7583	7	1.8158	7	1.8742	7	1.9336	7	1.9940
8	1.7602	8	1.8177	8	1.8762	8	1.9356	8	1.9960
9	1.7621	9	1.8197	9	1.8782	9	1.9376	9	1.9980
18.70	1.7640	19.00	1.8216	19.30	1.8801	19.60	1.9396	19.90	2.0001
1	1.7659	1	1.8235	1	1.8821	1	1.9416	1	2.0021
2	1.7678	2	1.8255	2	1.8841	2	1.9436	2	2.0041
3	1.7697	3	1.8274	3	1.8860	3	1.9456	3	2.0061
4	1.7716	4	1.8293	4	1.8880	4	1.9476	4	2.0082
5	1.7735	5	1.8313	5	1.8900	5	1.9496	5	2.0102
6	1.7754	6	1.8332	6	1.8919	6	1.9516	6	2.0123
7	1.7774	7	1.8352	7	1.8939	7	1.9536	7	2.0143
8	1.7793	8	1.8371	8	1.8959	8	1.9556	8	2.0163
9	1.7812	9	1.8391	9	1.8979	9	1.9576	9	2.0184
18.80	1.7831	19.10	1.8410	19.40	1.8998	19.70	1.9596	20.00	2.0204

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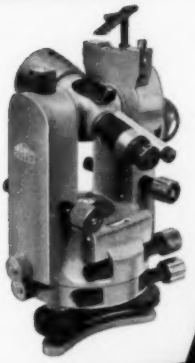

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CURRENT SURVEYING AND MAPPING LITERATURE

MAGAZINE ARTICLES

General Interest

EDITION SPECIALE. *Revue des Geometres-Experts et Topographes Francais,* 115eme Annee, No. 7, July 1953. (Entire issue devoted to the Eighth International Congress of Surveyors, Paris, August 28, 1953.)

POSITION HUNTERS ON HUDSON BAY. C. H. Ney. *The Canadian Surveyor,* Vol. 11, No. 5, July 1953. Historical account, with many interesting anecdotes, of the progress of precise surveying in the Hudson Bay area. Accompanied by a chronological summary of geodetic work in the area.)

HOW TO PLAN AND PAY FOR THE ADEQUATE HIGHWAYS WE NEED. Lacey V. Murrow. *Civil Engineering,* Vol. 23, No. 8, August 1953. (An experienced engineer makes recommendations which should be of interest to all engineers and many State legislatures.)

NEW 126-MILE AQUEDUCT TO SERVE PHENOMENAL GROWTH OF FLORIDA KEYS. John W. Greenleaf, Jr. *Civil Engineering,* Vol. 23, No. 8, August 1953. (Interesting discussion of a problem involving engineering in relation to a social anomaly.)

INDEX TO EARTH'S AGES. (Painted diagram.) On back cover of *The Lamp,* Vol. 35, No. 3, September 1953. (Elementary but interesting picture of some of the fossils associated with the stratae representing the various periods of geological time from Cambrian up through Tertiary.)

SOME HYDROGRAPHIC SURVEYORS OF THE EARLY NINETEENTH CENTURY. A. H. W. Robinson. *Empire Survey Review,* Vol. 12, No. 90, October 1953. (Historical account of early hydrographic survey methods based largely on the career of George Thomas. Illustrated by diagrams and maps.)

THE MILITARY SURVEY SERVICE AND THE CIVILIAN SURVEYOR. Lt. Col. R. C. A. Edge. *Empire Survey Review,* Vol. 12, No. 90, October 1953. (Discusses utilization of the resources of the peacetime survey profession in time of war.)

PIPE LOCATED ON MAP INSTEAD OF GROUND. (Staff article.) *Engineering News-Record,* Vol. 151, No. 20, November 12, 1953. (Aerial photographs from which planimetric maps were compiled, enabled skilled engineer to lay out the route of the 630-mile Superior-Sarnia pipeline in Wisconsin, Michigan, and Ontario "in the comfort of his office.")

EXPLORING FOR OIL AND MINERALS; IMPROVED TECHNIQUES AND INSTRUMENTS. G. M. Lees. *The Times (London) Science Review,* Winter, 1953. (General review of the subject with emphasis on air-borne survey methods now in general use.)

Cartography

ESBOCO HISTORICO DO DESHENO DE MAPAS. Ceurio de Oliveria. *Revista Brasileria de Geografia,* Ano 14, No. 2, April-June 1952. (Historical discussion, in Portuguese, of the progress of world mapping brought into relationship to the mapping of Brazil.)

SURVEYING AND MAPPING TRENDS IN GREAT BRITAIN. Maj. Gen. R. Ll. Brown, Director, Ordnance Survey of Great Britain. *The Canadian Surveyor,* Vol. 11, No. 5, July 1953. (A very detailed, illustrated account of the current operations of the Ordnance Survey.)

SURVEY CAMP: SOME NOTES ON THE MAKING OF LAND USE MAPS IN NATAL. H. Biescheuvel. *Empire Survey Review,* Vol. 12, No. 90, October 1953. (Details of operations during a special survey in southeast Africa.)

Control Surveys

SUR LA MESURE D'UNE DISTANCE A L'AIDE DU GEODIMETRE A BRUXELLES EN 1951. J. Loodts. Academie Royale de Belgique, *Bulletin de la Classe des Sciences,* 5e Serie, Vol. 38. (Extract.)

LA TRANSFORMATION DES COORDONNEES-APPAREIL EN COORDONNEES-TERRAIN DANS LE CHEMINEMENT AERIEN. A. Verdin. *Bulletin de la Societe Belge de Photogrammetrie,* No. 31, 1953. (Extract.)

ELECTRONIC TRILATERATION, BERING SEA AREA. Comdr. Philip C. Doran, U. S. Coast and Geodetic Survey. *The Canadian Surveyor,* Vol. 11, No. 5, July 1953. (Description of the employment of the Electronic Position Indicator System, supplemented by Shoran, to connect the islands in the Bering Sea to the Alaska mainland.)

THE EUROPEAN GRID CONVERSION PROGRAM. Col. J. G. Ladd, Commanding Officer, Army Map Service. *Army Information Digest,* Vol. 8, No. 8, August 1953. (An account of the adoption of the Universal Transverse Mercator grid system for military mapping.)

THE EARTH'S EQUATORIAL RADIUS AND THE DISTANCE OF THE MOON. John A. O'Keefe and J. Pamelia Anderson. *Bulletin Geodesique,* Nouvelle Serie, Annee 1953, No. 29, 1er Septembre 1953. (Mathematical description of a new method for determining the radius of the earth.)

Education

EDUCATION IN THE SHADOW OF THE IRON CURTAIN. Wolfgang O. L. Huebner, Free University of Berlin, Germany. *Science,* Vol. 118, No. 3057, July 31, 1953. (While not pertaining to any particular field of education this article will be of interest to anyone connected with academic endeavor.)

WHAT'S AHEAD IN ENGINEERING EDUCATION. (Three articles.) *General Electric Review,* Vol. 56, No. 6, November 1953. ("Four-year Engineering Program" by Dr. J. F. Downie Smith; "Five-year Engineering Program" by Dr. S. C. Hollister; and "Unified Engineering Curriculum" by Dr. L. M. K. Boelter.)

Instruments

A FUNCTION CALCULATOR AS APPLIED TO GEODESY. K. Ramsayer. *Bulletin Geodesique,* Nouvelle Serie, No. 29, 1er Septembre 1953. (Shows that the range of computation in normal calculators can be extended to functions by providing a usual machine with both a storage unit containing approximate values of functions for arguments in rough steps and factors of interpolation and a device for transferring the values from the storage unit into the calculator proper.)

Topography

LES TRAVAUX CARTOGRAPHIQUES AU KATANGA. Jean van der Straeten. *Bulletin de la Societe Royale Belge de Geographie,* June 1953. (Detailed history of the exploration, surveying, and mapping of a large area of the Belgian Congo; miscellaneous maps and illustrations.)

BOOKS AND PAMPHLETS

ENGINEERING DRAWING. Josef V. Lombardo, Albert J. Lombardo, Lewis O. Johnson, and W. Irwin Short. 432 pp. *Barnes and Noble,* 105 Fifth Ave., New York 3, N. Y. $2.00.

ENGINEERING DRAWING. Frank Zozora. 369 pp. *McGraw-Hill Book Co.,* 330 W. 42nd Street, New York 36, N. Y. $5.00.

PRACTICAL GUIDANCE METHODS FOR COUNSELORS, TEACHERS, AND ADMINISTRATORS. Robert H. Knapp. 319 pp. *McGraw-Hill Book Company,* 330 W. 42nd St., New York 36, N. Y. $4.25.

LA CARTOGRAFIA UFFICIALE ITALIANA (con catalogo delle pubblicazioni dell 'I.G.M.). Italy. Istituto Geografico Militare. Firenze, 1953. 35 pp. (Official Italian cartography. Parts one and two dated 1950; parts three and four revised to January 1952 and accompanied by additions and corrections to January 1953. Italian text.)

ACROSS THE MAP OF THE U. S. S. R. Nicolay N. Mikhaylov. Moscow, *Foreign Languages Publishing House,* 1950. 344 pp. (Soviet geography reflected on maps. English edition has postscript.)

MAP INTERPRETATION. G. H. Drury. *Sir Isaac Pitman & Sons, Ltd.,* London, 1952. xi and 203 pages. 22 illustrations and index. ($3.25 from the British Book Center, 122 E. 55th Street, N. Y.)

THE STANDARD MANUAL OF THE SLIDE RULE: ITS HISTORY, PRINCIPLE AND OPERATION. J. E. Thompson. Second edition. Demy, 8 vo., viii and 216 pp. London, *MacMillan and Co., Ltd.,* 1952. 15s net.

MAPS OF AFRICA SOUTH OF THE SAHARA. Scientific Council for Africa South of the Sahara. Publication No. 4. 122 pp. April 1953. (Address: Secretaire General, C. S. A., B. P. 5175, Bukavu, Congo Belge. Publication is bilingual, English and French.)

SEGNI CONVENZIONALI E RAPPRESENTAZIONE DEI PARTICOLARI TOPOGRAFICI NELLA MAPPA. Italy. Direzione Generale de Catasto. Roma, Istituto Poligrafico dello Stato, 1953. 17 pp. (Italian mapping signs and symbols. Italian text.)

LES METHODES DE FRIEDRICH-JENNE ET DE BOLTZ POUR LA COMPENSATION DE RESEAUX GEODESIQUES COMPORTANT JUSQU'A QUELQUES CENTAINES D'EQUATIONS DE CONDITIONS. R. Marchant. Ministere de la Defense Nationale, Institut Geographique Militaire, Bruxelles, 1953. 54 pp. Diagrams, extensive tables.

SIMPLIFIED DRAFTING PRACTICE. W. L. Healy and A. H. Rau. 156 pp. Diagrams, illustrations. New York, *John Wiley & Sons, Inc.*, 1953. $5.00.

PLASTIC RELIEF MAPS, CONSTRUCTION AND USE. U. S. Army Map Service. 11 pp. Washington, 1953.

—LYMAN D. LYNN

DISTINCTIVE RECENT MAPS

For the reader's convenience, the addresses of publishers and prices of maps are given where this information is available.—EDITOR

Plate 10 of the American Geographical Society's "Atlas of Diseases" is entitled *Distribution of Rickettsial Diseases, 1. Louse-Borne and Flea-Borne Typhus.* On a Briesemeister elliptical equal-area projection world map (scale, 1 : 37,500,000), regions afflicted with "louse-borne typhus," "flea-borne typhus," and "both louse-borne and flea-borne typhus" are delimited. A brief "epidemiology" and statistical tables fill the corners of the map sheet. On the verso are printed basic reference sources and a bibliography by countries. This map, as previous ones in this series, was prepared under the direction of Dr. Jacques May of the Society's staff.

Martha's Vineyard has long been a favorite subject for artist-cartographers. B. Ashburton Tripp, 601 Queen Street, Alexandria, Va., is the most recent to produce a map of this island. Mr. Tripp's black and white map is attractively and artistically drawn. A wide border around the map is filled with sketches of landscapes, ocean scenes, ships, churches, and historic landmarks. The map, copyrighted in 1953, is at the approximate scale of 1 : 80,000 and measures 24½ by 30½ inches.

Scenic and Historic Illinois is the title of a colorful pictorial map published by the State of Illinois, William G. Stratton, Governor. It was copyrighted in 1953 by E. H. Brown and R. A. Burleigh, and lithographed by Rand McNally and Company. The "map is intended to depict the dramatic, historic, and legendary events, and the great figures in Illinois history commemorated by Illinois State Parks and Memorials, and to portray some of the scenic beauties that are found in all sections of the State." The scale is approximately 1 : 800,000 and the dimensions are 33 by 21 inches. A sketch map locating State Parks and Memorials and descriptive and historical text occupy the verso of the map sheet.

A map showing *Distribution of Precipitation in Colorado,* prepared by the Colorado State Planning Commission, was published in 1953. Based upon U. S. Weather Bureau data, the map outlines areas of "average annual precipitation in inches" by means of isohyets, while bar graphs indicate average monthly precipitation, in inches, of different areas in Colorado. The map, which measures 16½ by 20 inches, has a scale of 1 : 1,300,000.

The Province of Ontario [Canada], Department of Mines' Map No. 1953-A is entitled *Mineral Map of the Province of Ontario.* It measures 41 by 56 inches and is at the scale of 1 : 1,267,200. Contrasting colors differentiate regions of "sedimentary rocks," "granite rocks," and "intrusive rock." Appropriate symbols indicate railways, main roads, geological boundaries, metallic and non-metallic mineral regions, gas fields, pipe lines, etc. In the margins are lists of "Principal mines and mineral occurrences" which are keyed to numbers on the map. Several enlarged inset maps show major mineral producing areas in greater detail. Another inset shows location of smelters and refineries, iron blast furnaces, and ferro alloy plants in Ontario.

Generalized relief, portrayed by hypsometric tints, features the *Mapa Geografico del Ecuador,* compiled in 1950 for the Instituto Geografico Militar. In addition to relief it shows administrative boundaries, transportation lines, airports, and towns and cities. The "Archipelago of Colon" and the "Isles Galapagos" appear on inset maps. The measurements of the main map are 37 by 46 inches and it is at the scale of 1 : 1,000,000.

Two new *landform* maps have recently come from the skilled pen of Erwin Raisz. The first, *Landforms of Central America,* portrays by means of Raisz' distinctive technique the complicated relief pattern of that region. The map measures 10½ by 13½ inches and is at the approximate scale of 1 : 5,000,000.

Landform Map of North Africa is the title of Raisz' second new physiographic map. It was prepared in 1952 for the Environmental Protection Branch, Office of the Quartermaster General. At the approximate scale of 1 : 4,500,000, the map portrays an amazing amount of topographic detail in the varied North African landscape. The map is based primarily on trimetrogon airplane photographs, supplemented by information from published maps. An inset map outlines political divisions and landform regions. A north-south profile from Tibesti Mountains to Sirte shows the geological structure. Dimensions of the map are 21 by 46 inches.

Orders for the maps may be sent to Dr. Raisz, 107 Washington Avenue, Cambridge 40, Mass.

Kenya—Political & General presents, at a scale of 1 : 1,000,000, the east African colony which has been much in the news in recent months. The map, published under the direction of the Director of Surveys, Survey of Kenya

[Nairobi], is printed on two sheets each measuring 24½ by 35 inches. It shows, by color and symbol designations, Crown Lands, Crown Forest Reserves, and National Parks, as well as Native Land Units, Reserves, Settlement Areas, and Forest Reserves. An inset map shows annual average rainfall. Population and population density by provinces and districts are given in a table.

The Division of Botany and Plant Pathology, Department of Agriculture, Union of South Africa, published in 1951 a map showing *Veld Types of South Africa.* It was prepared by J. P. H. Acocks, and printed at Pretoria by the Government Printer. Seventy "veld types," classified in ten major groups, are mapped. Legends and map titles are given in English and Afrikaans. The map is at the scale of 1 : 1,500,000 and is on two sheets, each measuring 37 by 25 inches.

The industrial heartland of western Europe is embraced on a map entitled *Rheinisch-Westfälisches Industriegebiet,* published in 1953 by Willy Grosschen of Dortmund, Germany. Besides locating the many urban centers of this highly industrialized area, the map shows generalized topography with contour lines, roads and railroads, political boundaries, and forests. Published at the scale of 1 : 100,000, the map extends northward to 51°50′, southward to 51°08′, eastward to 8°, and westward to 6°05′. The map measures approximately 36 by 53 inches.

Two maps showing details of the Rhein River waterways were recently prepared by F. Siepmann and published by "Rhein" Verlagsgesellschaft m.b.H., Haus Rhein, Postfach 142, Duisburg, Germany. The lower course of the stream, with its numerous distributaries and canals in Belgium and the Netherlands, is shown on *Wasserstrassen-Anschlusskarte vom Rhein nach den Niederlanden, Belgien und Nordfrankreich.* It is at the scale of 1 : 700,000 and measures 31½ by 25 inches. Water depths, harbors, locks, railroad lines, political boundaries, and other basic information are mapped. The major ports are shown on enlarged inset maps.

The entire course of the river from the Bodensee to the North Sea is charted on *Rheinkarte Bodensee Nordsee.* It includes a table listing all ports and landings with distances between them. The scale of this map is 1 : 600,000 and the measurements are 37 by 26 inches.

The Österreichisches Gesellschafts- und Wirtschaftsmuseum published in 1953 a colorful new economic map of Austria. It bears the title *Wirtschaftskarte Von Österreich.* Pictorial symbols locate mines, quarries, power plants, and various types of industrial establishments. There are enlarged inset maps of Wien, Graz, and Linz. The main map measures approximately 28 by 48 inches and is at the scale of 1 : 500,000.

Alimentation en Energie Électrique et Regions Industrielles de la Suisse is the title of a large new map showing power centers and industrial regions of Switzerland. It was published in 1950 by Kummerly and Frey (Berne, Switzerland). The map is at the scale of 1 : 200,000 and is printed on two sheets, each measuring 44 by 34 inches. Power plants, transmission lines, and various types of industrial establishments are designated with appropriate symbols. The legend and title are given in French, German, and Italian.

A new *Administrative Map of the U.S.S.R.* was published in 1953 by the Geographical Section, General Staff of the [British] War Office. It is at the scale of 1 : 8,000,000 and measures 29 by 42 inches. Names on the map are transliterated according to the U. S. Board on Geographic Names system. At the base of the map there is a list of "Administrative Divisions and Capital Towns with reference to the nearest degree."

The map supplement to the October 1953 number of the National Geographic Magazine features *China Coast and Korea.* The map is constructed on an oblique Mercator projection and is placed at an angle on the map sheet to permit use of a larger scale (1 : 3,500,000) than would otherwise be possible on the maximum map supplement sheet. The area covered extends from central Manchuria on the north to the northwestern portion of Indochina on the south. The eastern part of the map includes portions of the Japanese and Philippine Islands. The map shows railways, roads, canals, principal airports, and numerous place names. Mountains are indicated by blue and yellow shading. Copies of the map are available from the Society at fifty cents (paper) and one dollar (printed on fabric). An index, listing 6,234 place names which appear on the map, is priced at 25 cents.

The second edition of *India and Adjacent Countries,* by the Survey of India, was published in 1952. It is at the scale of 1 : 2,534,400 and is printed on four sheets each of which measures approximately 31 by 33 inches. The map features administrative divisions and transportation lines. Small inset maps show "Geographical Features," "Isothermal Lines," "Average Rainfall," "Density of Population," "Principal Industries," "Geology and Principal Minerals," and "India and Surrounding Countries."

The *Main Road Map of Japan* was published in 1953 by Nihon Chizu Co., Ltd., 2, 3 Chome Kanda-Jimbocho Chiyodaku, Tokyo, Japan. A

number of enlarged insets of various urban centers fill the corner spaces and margins of the map sheet which measures approximately 29 by 41 inches. Other marginal data include an index of major places and a table giving mileages from Tokyo to various destinations.

In addition to roads, the map shows administrative boundaries, airlines, national parks, mountains and volcanoes, shrines and temples, and recreational centers. The scale is 1 : 1,500,000.

Several interesting new maps of Western Australia have recently been acquired. *The Geological Sketch Map of Western Australia 1950* shows generalized geology of the area at the scale of 1 inch to 40 miles. East-west and north-south diagrammatic sections give the underlying geological structure. The map was compiled from information supplied by various governmental and private agencies, and collated by J. H. Lord and N. M. Gray of the Geological Survey of Western Australia. It is printed on two sheets each measuring 24 by 35 inches.

The Lands and Surveys Department published in 1951 a *Map of Western Australia Showing Localities of Sheep and Cattle Stations.* It shows stations and homesteads, stock routes, highways, main routes, road board district boundaries, and isohyets. The index grid to the 300 Chain Scale Plan is superimposed on the map. Printed on two sheets, each measuring 27 by 37 inches, the map has a scale of 1 inch to 30 miles.

Map of Southwest Division of Western Australia shows the location of various economic activities and products. A table gives production figures for selected commodities for the years 1900, 1931, and 1951. Railways and isohyets are also traced on the map. An inset shows similar, but more generalized, data for all of Western Australia. The main map measures 29½ by 22 inches and is at the scale of 1 : 1,300,000. It was drawn by Marie Fimister, published by the Lands and Surveys Department, and printed in Perth by William H. Wyatt, Government Printer.

—WALTER W. RISTOW

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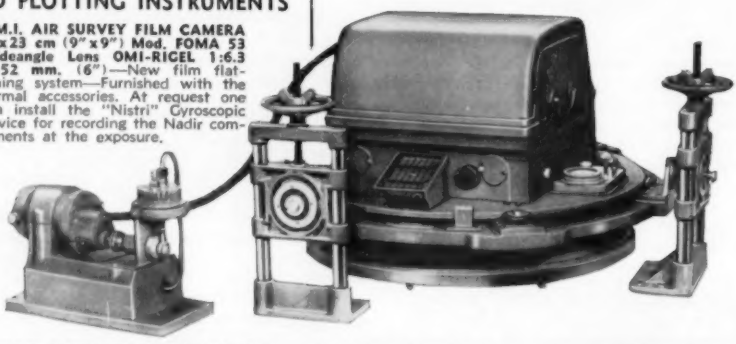

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MAP INFORMATION

This department was inaugurated for the purpose of bringing to the attention of the members information pertaining to the availability of maps, surveys, etc., with particular emphasis on how such material can be procured. Authoritative articles covering this class of information are solicited. It is believed that through an interchange and dissemination of such information maximum benefits will accrue to the surveying and mapping profession.

—EDITOR

Topographic Maps

THE FOLLOWING quadrangle maps were published by the U. S. Geological Survey between September 1 and November 30, 1953. The list includes newly compiled maps; revised maps on which contours and drainage usually are unchanged but the works of man are brought up to date; and series-converted maps which are 15-minute maps produced from four 7½-minute maps of the same area. The maps are new unless otherwise designated by numerical superscript.

The quadrangle name (in capital letters) is followed by the name of the county (in upper- and lower-case letters) that contains the place or feature for which the quadrangle is named.

All maps are available with or without the green overprint that indicates woodland. These maps show the shape and elevation of the land surface (represented by contour lines, printed in brown); water features (in blue); works of man, including cities, towns, and scattered habitations, schools, churches, railroads, roads, and boundaries (in black); and woodland areas (in green). Principal roads are shown by a red overprint. In areas that have been covered by General Land Office Surveys, township and section lines are shown. The State rectangular coordinate systems are indicated in the margins of the maps. An information folder further describing topographic maps and symbols is available on request.

Standard quadrangle maps may be obtained for 20 cents per copy. A discount of 20 percent is allowed on orders amounting to $10 or more at the retail price. Orders should be addressed to the U. S. Geological Survey, Washington 25, D. C. (or Denver 15, Colo., for maps of areas west of the Mississippi River).

Alabama

ANNISTON—Calhoun
ANNISTON*[1]—Calhoun
COLVIN GAP—Etowah
COX GAP—St. Clair
EULATON—Calhoun
JACKSONVILLE—Calhoun
OXFORD—Calhoun
RAGLAND—St. Clair
RAGLAND*[1]—St. Clair
RIVERSIDE—St. Clair
STEELE—St. Clair
STEELE*[1]—St. Clair

Alaska

GULKANA (C-4)*—Third Judicial Division
GULKANA (C-5)*—Third Judicial Division
GULKANA (D-6)*—Third Judicial Division
HEALY (A-1)*—Third Judicial Division
HEALY (A-3)*—Third Judicial Division
MT. HAYES (A-5)*—Fourth Judicial Division
TALKEETNA MOUNTAINS (A-2)*—Third Judicial Division
TALKEETNA MOUNTAINS (A-3)*—Third Judicial Division
TALKEETNA MOUNTAINS (B-1)*—Third Judicial Division
TALKEETNA MOUNTAINS (B-2)*—Third Judicial Division
TALKEETNA MOUNTAINS (D-2)*—Third Judicial Division
TALKEETNA MOUNTAINS (D-4)*—Third Judicial Division
TANACROSS (A-6)*—Fourth Judicial Division

* Indicates 15-minute quadrangle; all others are 7½-minute quadrangles.
[1] Indicates a series-converted map.
[2] Indicates a revised map.

Arizona
MT. HUGHES—Santa Cruz

Arizona-California
YUMA WEST—Yuma

Arkansas
BRADLEY NE—Lafayette
DODDRIDGE NE—Miller
DODDRIDGE NW—Miller
FOUKE SE—Millard
MANDEVILLE—Miller

Arkansas-Louisiana
DODDRIDGE SE—Lafayette

California
AVENA—San Joaquin
CALABASAS—Los Angeles
COLFAX*[1]—Placer
COLUSA—Colusa
COURTLAND—Sacramento
DAVIS—Yolo
ELDORADO BEND—Yolo
EL PORTAL*[1]—Mariposa
FURNACE CREEK*—Inyo
GEORGETOWN*[1]—Eldorado
HELENA*—Trinity
IRONSIDE MTN.*—Trinity
KURAND—Glenn
LEGRAND*[1]—Merced
LOGANDALE*—Glenn
MARIPOSA*[1]—Mariposa
McCOY SPRING*—Riverside
MERRITT—Yolo
MIDLAND*—Riverside
MOKELUMNE HILL*[1]—Calavasas
MOULTON WEIR—Colusa
NICOLAUS—Sutter
OLIVEHURST—Yuba
PRINCETON—Colusa
RED BANK—Tehama
RIPLEY—Riverside
SAXON—Yolo
TOPANGA—Los Angeles
TUSCAN SPRINGS—Tehama
VERONA—Sutter
WHEATLAND*[1]—Yuba
WHITE LEDGE PEAK—Ventura
WHITE RIVER*[2]—Tulare
WOODLAKE—Tulare
WOODLAND—Yolo
WOODWARD ISLAND—San Joaquin

California-Arizona
PALO VERDE—Imperial

California-Nevada
CHLORIDE CLIFF*—Inyo
RYAN*—Inyo

Colorado
DEARFIELD—Weld
ILIFF—Logan
MADRID—Las Animas
PEACE VALLEY SCHOOL—Morgan
POINT OF ROCKS—Wells
STARKVILLE—Las Animas
TRINIDAD—Las Animas
VALDEZ—Las Animas

Connecticut
MIDDLE HADDAM[2]—Middlesex

Florida
BAYWOOD—Putnam
BOSTWICK—Putnam
FIFTONE—Duval
FORT KISSIMMEE NW—Polk
GOLD HEAD BRANCH—Clay
JACKSONVILLE HEIGHTS—Duval
KEYSTONE HEIGHTS—Clay
KINGSLEY—Clay
LAKE WEOHYAKAPKA NE—Osceola
LAKE WEOHYAKAPKA SE—Polk
MIDDLEBURG—Clay
MIDDLEBURG SW—Clay
PENNEY FARMS—Clay
PICOLATA—St. Johns
PUTNAM HALL—Putnam
RICE CREEK—Putnam
RIVERDALE—St. Johns
RODMAN—Putnam
SAMPSON—Bradford
STARKE—Bradford
WALDO—Alachua

Georgia
LUMPKIN—Stewart
TALBOTTON—Talbot
WAVERLY HALL—Harris

Idaho
RIGBY*[1]—Jefferson

Indiana
COAL CITY[2]—Owen
HYMERA[2]—Sullivan
MUNCIE EAST—Delaware

Indiana-Kentucky
EVANSVILLE—Vanderburgh
MOUNT VERNON—Henderson

Kansas
BURLINGAME—Osage
DOVER—Shawnee
DOWNS SOUTH—Osborne
ELMONT—Shawnee
GROVE—Shawnee
HARVEYVILLE—Osage
MERIDEN—Jefferson
ROSSVILLE—Shawnee
SILVER LAKE—Shawnee

Kentucky
ALLEGRE—Todd
CECILIA—Hardin
CLAY CITY—Powell
COLETOWN—Fayette
CORNISHVILLE—Mercer
CRAB ORCHARD—Lincoln
DUBLIN—Graves
ELIZAVILLE—Fleming
HONEY GROVE—Christian
JACKSON—Breathitt
LEBANON JUNCTION—Bullitt
LIBERTY—Casey
LITTLE HICKMAN—Jessamine
NORTH MIDDLETOWN—Bourbon
PALMER—Estill
PLEASANT GREEN HILL—Christian
SACRAMENTO—McLean
SHARON GROVE—Todd
STANTON—Powell
UNION CITY—Madison
VALLEY VIEW—Madison
VOX—Laurel

Kentucky-Indiana
HENDERSON—Henderson

Kentucky-Indiana-Ohio
LAWRENCEBURG—Dearborn

Kentucky-Ohio
BURLINGTON—Boone

Kentucky-Tennessee
CUBA—Graves

Louisiana
BRETON ISLAND*—Plaquemines
EMPIRE*[2]—Plaquemines
INDIAN BEACH[2]—Jefferson
LA BRANCHE[2]—St. Charles
LITTLE WOODS[2]—Orleans
SPANISH FORT—Orleans

Maryland
ROUND BAY—Anne Arundel

Michigan
ESTRAL BEACH[2]—Monroe

Mississippi-Tennessee
HOLLY SPRINGS*—Marshall

Montana
BRISBIN—Park
CHIMNEY ROCK—Park
CLYDE PARK—Park
KELLY HILLS—Sweet Grass
LIVINGSTON PEAK—Park
McLEOD—Sweet Grass
MISSION—Park
SQUAW PEAK—Sweet Grass
WILSALL—Park

Nevada
CORN CREEK SPRINGS*—Clark
DRY LAKE*—Clark

Nevada-Arizona
HENDERSON*—Clark

New Jersey-Pennsylvania
CAMDEN—Camden

New Mexico
ABEYTAS—Socorro
BECKER—Valencia
CERRO MONTOSO—Socorro
JEMEZ*[2]—Sandoval
LA JOYA—Socorro
LOS LUNAS SE—Valencia
RIO PUERCO—Valencia
SAN ACACIA—Socorro
TOME NE—Valencia
TOME SE—Valencia
TURN—Valencia
VEGUITA—Socorro

New York
ATTICA*[1]—Wyoming
DEPEW*[1]—Erie
LOCKPORT*[1]—Niagara
NATURAL BRIDGE—Jefferson
NEWARK—Wayne
RUSHVILLE—Yates
TONAWANDA*[1]—Niagara

North Carolina
DURHAM NORTH*[2]—Durham
DURHAM SOUTH*[2]—Durham
HACKNEY—Beaufort
HAMLET—Richmond
HOFFMAN—Richmond
LAURINBURG—Scotland
MARSTON—Richmond
MILLSTONE LAKE—Richmond
SILVER HILL—Scotland
WAGRAM—Scotland
WAKULLA—Robeson
WEST END—Moore

North Carolina-South Carolina
GHIO—Richmond
GIBSON—Scotland

Ohio
LACARNE—Ottawa
TONTOGANY[2]—Wood

Oregon
MONUMENT*—Grant
SNOW PEAK*—Linn

Pennsylvania
COLLEGEVILLE—Montgomery
RENOVO WEST*[1]—Clinton

Pennsylvania-New Jersey
FRANKFORD—Philadelphia
PHILADELPHIA—Philadelphia

Puerto Rico
AGUAS BUENAS[2]—Aguas Buenas
HUMACAO[2]—Humacao
JUNCOS[2]—Juncos
MONTE GUILARTE[2]—Adjuntas
NAGUABO[1]—Naguabo
PUNTA GUAYANES[2]—Yabucoa
PUNTA PUERCA[2]—Ceiba

South Dakota
BADNATION—Mellette
CEDAR CANYON—Perkins
CUNY TABLE WEST—Shannon
DEEP CREEK—Perkins
FAITH NE—Perkins
HEUTMACHER TABLE—Pennington
IDEAL NE—Tripp
IDEAL NW—Tripp

MINNEKAHTA NE—Fall River
REDELM NE—Ziebach
RED SHIRT—Shannon
RED SHIRT NE—Shannon
RED SHIRT SW—Shannon
RIDGEVIEW NE—Dewey
RIDGEVIEW NW—Dewey
WILLOW CREEK NW—Shannon

Tennessee

BONICORD—Dyer
CAMDEN—Benton
DRESDEN—Weakley
DYERSBURG—Dyer
HELENWOOD—Scott
HONEY CREEK—Scott
LANE—Dyer
NEWBERN—Dyer
POPLAR CREEK—Benton
ROBBINS—Scott
RUGBY—Morgan
SPRINGFIELD NORTH—Robertson
YOUNGVILLE—Robertson

Tennessee-Kentucky

Paris Landing—Henry

Texas

Brazoria—Brazoria
CEDAR LAKES WEST—Matagorda
CHINA GROVE—Scurry
EDNA—Jackson
FRANCITAS NE—Matagorda
GREEN LAKE—Calhoun
HERMLEIGH—Scurry
MARCADO CREEK—Victoria
MATAGORDA—Matagorda
PORT LAVACA WEST—Calhoun
POTRERO CORTADO—Kenedy
SNYDER—Scurry
YARBOROUGH PASS—Kenedy

Utah

FIVEMILE PASS*1—Tooele
SALTAIR NE—Salt Lake
SALT LAKE CITY NORTH—Salt Lake
SALT LAKE CITY SOUTH—Salt Lake
THE KNOLL*—Grand
WARREN DRAW—Uinta

Utah-Colorado

WILLOW CREEK BUTTE—Daggett

Virginia

ALTAVISTA*—Campbell
BACONS CASTLE—Surry
BOONES MILL*—Franklin

Washington

ECHO VALLEY—Stevens
WICKERSHAM*2—Whatcom

Wisconsin

LUBLIN*—Taylor
THUNDER MTN.*—Marinette
WABENO*—Forest

Wyoming

AGATE BUTTE—Tremont
ARMINTO SW—Natrona
BEAR SPRING—Natrona
BIRDSEYE PASS—Fremont
CROOKS CREEK NE—Fremont
CROOKS MTN.—Fremont
DOUBLE BUTTE—Fremont
FORT WASHAKIE—Fremont
GATES BUTTE—Fremont
GRAHAM RANCH—Fremont
GRAVE SPRING—Natrona
HILLBERRY RIM—Hot Springs
LANKIN DOME—Fremont
MONETA—Fremont
MONETA SE—Fremont
MUSKRAT BASIN—Fremont
MYERS RANCH—Fremont
OCLA DRAW—Fremont
PATHFINDER DAM—Natrona
PATHFINDER RESERVOIR NW—Natrona
PUDDLE SPRINGS—Fremont
SHEEP MOUNTAIN—Big Horn
SOAP HOLES—Fremont
STAMPEDE MEADOW—Fremont
WILSON SPRING—Park

The following map is also available in the shaded-relief edition:

Maryland-West Virginia

KITZMILLER—Garrett

In addition to the standard series of quadrangle maps, reconnaissance maps at the scale of 1 : 250,000 are being published for both the continental United States and Alaska. The maps in this series published in the period and listed below are all shaded-relief editions except PORT MOLLER.

Alaska

CRAIG—First Judicial Division
KETCHIKAN—First Judicial Division
PETERSBURG—First Judicial Division
PORT ALEXANDER—First Judicial Division
PORT MOLLER—Third Judicial Division
SITKA—First Judicial Division.

Public Land Survey Plats

THE FOLLOWING plats of public land surveys and resurveys were completed and accepted by the Bureau of Land Management, U. S. Department of the Interior, between September 1 and November 30, 1953. The class or purpose of the survey is indicated. Copies of the plats may be secured from the Bureau Offices in the State or from the Director, Bureau of Land Management, Department of the Interior, Washington 25, D. C.

Alaska

Elfin Cove Group Homesites—U. S. Survey 2946
Elfin Cove Group Homesites—U. S. Survey 2947
Elfin Cove Group Homesites—U. S. Survey 2948
Elfin Cove Group Homesites—U. S. Survey 2949
Elfin Cove Group Homesites—U. S. Survey 2950
Elfin Cove Group Homesites—U. S. Survey 2951
Elfin Cove Group Homesites—U. S. Survey 2952
Elfin Cove Group Homesites—U. S. Survey 3175
Goat Creek Small Tract Group—U. S. Survey 3235
Goat Creek Small Tract Group—U. S. Survey 3236
Goat Creek Small Tract Group—U. S. Survey 3237
Goat Creek Small Tract Group—U. S. Survey 3238
Goat Creek Small Tract Group—U. S. Survey 3239
Goat Creek Small Tract Group—U. S. Survey 3240
South Point Higgins Group—U. S. Survey 3153
South Point Higgins Group—U. S. Survey 3154
South Point Higgins Group—U. S. Survey 3155
South Point Higgins Group—U. S. Survey 3156
South Point Higgins Group—U. S. Survey 3157
South Point Higgins Group—U. S. Survey 3158

Alaska—Seward Meridian

T. 17 N., R. 2 E., subdivision of section
T. 18 N., R. 2 E., subdivision of section
T. 14 N., R. 2 W., subdivision of section

Alaska—Fairbanks Meridian

T. 4 S., R. 4 E., subdivision of section
T. 5 S., R. 4 E., subdivision of section

Alaska—Copper River Meridian

T. 6 N., R. 1 E., subdivision of section
T. 4 N., R. 1 W., subdivision of section
T. 4 N., R. 2 W., subdivision of section

Arizona—Gila and Salt River Meridian

T. 11 S., R. 6 W., subdivision of section
T. 12 S., R. 6 W., subdivision of section
T. 2 N., R. 20 W., original survey

California—Mount Diablo Meridian

T. 32 N., R. 5 W., retracements

Colorado—Sixth Principal Meridian
T. 2 N., R. 66 W., resurvey
T. 2 N., R. 67 W., resurvey
T. 1 N., R. 68 W., resurvey
T. 2 N., R. 68 W., resurvey
T. 1 N., R. 69 W., resurvey
T. 2 S., R. 79 W., subdivision of section
T. 10 S., R. 98 W., subdivision of section
T. 11 S., R. 98 W., subdivision of section

Florida—Tallahassee Meridian
T. 22 S., R. 37 E., subdivision of section

Idaho—Boise Meridian
T. 9 S., R. 44 E., extension survey

Montana—Principal Meridian
T. 16 N., R. 3 E., subdivision of section

Nevada—Mount Diablo Meridian
T. 26 N., R. 52 E., extension survey
T. 26 N., R. 53 E., extension survey

New Mexico—New Mexico Principal Meridian
T. 30 N., R. 13 W., resurvey

Oregon—Willamette Meridian
T. 9 S., R. 3 E., subdivision of section
T. 3 S., R. 7 E., amended tract survey
T. 28 S., R. 10 W., resurvey
T. 39 S., R. 14 E., resurvey

Utah—Salt Lake Meridian
T. 1 N., R. 1 W., resurvey
T. 3 N., R. 1 W., resurvey
T. 4 N., R. 1 W., resurvey
T. 5 N., R. 1 W., resurvey
T. 3 N., R. 1 E., resurvey

Wisconsin—Fourth Principal Meridian
T. 39 N., R. 11 E., omitted land survey

Wyoming—Sixth Principal Meridian
T. 50 N., R. 66 W., resurvey
T. 50 N., R. 67 W., resurvey
T. 55 N., R. 76 W., resurvey
T. 57 N., R. 76 W., resurvey
T. 50 N., R. 77 W., resurvey
T. 51 N., R. 77 W., resurvey
T. 52 N., R. 77 W., resurvey
T. 55 N., R. 77 W., resurvey
T. 56 N., R. 77 W., resurvey
T. 57 N., R. 77 W., resurvey
T. 52 N., R. 78 W., resurvey
T. 55 N., R. 78 W., resurvey
T. 52 N., R. 79 W., resurvey

Virginia Association of Surveyors

SLIDING and slipping through Virginia's worst storm in years, 45 surveyors and their wives converged on the Jefferson Hotel in Richmond, January 22–23, to attend the Sixth Annual Meeting of the Virginia Association of Surveyors. This was the start of Surveyor Week for the profession in Virginia, as the meeting was followed by the 5th Annual Refresher Course at VMI in Lexington, January 25–29.

The meeting began Friday evening with the Charter dinner of the Association's second chapter, the Central Virginia Chapter. Charter membership, because of the weather, was left open for 30 days, but 23 have already joined this latest venture.

Saturday's speakers and panel members included Turner Burton, Director of the Department of Professional and Occupational Registration; Jack Kenny of Lawyers Title Insurance Corporation; Frederick Faye of the Richmond Re-Development and Housing Authority; Martin Richwine, Richmond Director of Public Works; Fred Morris, Professor, VPI; and George Passage, News Analyst. Mr. Morris explained his proposed book to cover land laws of Virginia.

The business sessions included a resumé of the year's progress, highlights of which were: membership rose from 89 to 115 which includes almost 80 percent of the practicing offices in the State; the formation of the new chapter and the increase in the Northern Virginia Chapter's membership from 23 to 33; the basic questionnaire sent out for the study of fees and salaries; and the adoption by unanimous vote of the members voting of a Canon of Ethics for Surveyors.

Discussions and motions passed at the session included opposition to proposed legislation requiring a seal on all plats; support of legislation allowing surveyors the same right of "criminal" trespass enjoyed by public utility and highway department employees; support of clarification by the Internal Revenue Department that surveyors who hold an engineer license cannot come under Social Security; support of information exchange with affiliate members of ACSM as a means of bolstering activity of the Property Surveys Division; support of action to push the new Ethics standards adopted, by presenting it at the forthcoming ACSM meeting, by sending it to all surveyors in the State, and by having it included, by the department, in all future applications for license.

Retiring President Jim Payne was given a standing ovation as he turned the meeting over to the new officers, who are Wilton Whipp, *President;* Carson Carlisle, *Vice-President;* and Lee Carpenter, *Director.* Victor Ghent was elected to serve his third term as Secretary-Treasurer.

Comment and Discussion

The pages of SURVEYING AND MAPPING are open to a free and temperate discussion of all matters pertaining to the interests of the CONGRESS. It is the purpose of this Department to encourage comments on published material or the presentation of new ideas in an informal way.
—EDITOR.

COMPETITIVE BIDS FOR SURVEYING SERVICES*

ALBERT W. DANIELS†—I am writing to you in connection with the organized opposition that civil engineers and surveyors are building up here in the matter of certain departments of government inviting competitive bids for the performance of engineering and surveying services.

A case in point which has aroused the ire of professional men is the recent calling for bid proposals for the surveying and mapping of certain tracts of land in the Linda Vista Housing Project in San Diego, Calif. For further information on this, I refer you to the last issue of *Civil Engineering*, December 1953, published by the American Society of Civil Engineers (of which I am an associate member), pages 77 and 78, in which are reproduced certain letters addressed to the public Housing Administration in Washington protesting the policy of calling for competitive bids for professional services.

Another case which came to light recently is the calling for bids for engineering services by the Chief Highway Commissioner of the State Highway Department of South Carolina. The bids for this work submitted by thirteen engineering firms ranged from 2.9 to 7.5 percent.

On the Linda Vista Project, the lump sum price from thirteen bidders ranged from $2,475.00 for the low to $18,000.00 for the high.

How can you set a price on engineering skill and brains?

I am also disturbed by the remarks that were made by certain Public Housing officials that the department had ruled that "surveying and mapping" were considered "subprofessional" work. I think that this attitude on the part of a government agency should be corrected.

I believe there is substantial precedent to prove that surveying and mapping are sciences and professions, and are recognized as such by the courts of the land and all large business institutions and government departments.

It is well known that surveying and mapping is an adjunct and a department of civil engineering. Here, locally, some civil engineers spend the most of their practice in surveying and mapping and not necessarily in design work.

The local engineers and surveyors have been fighting this battle for the last two or three years. Up to now we have consistently refused to bid on government projects in this manner; further, may I point out that the code of ethics of the American Society of Civil Engineers prohibits competitive bidding by professional men for services, and I quote: "It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the American Society of Civil Engineers to participate in competitive bidding on a price basis to secure a professional engagement."

In view of the foregoing, may I solicit the support of the American Congress on Surveying and Mapping, of which I am a member, in carrying on this fight against forcing engineers and surveyors to compete against one another in order to secure a professional engagement.

* *See* "Competitive Bidding Versus Professional Status," by S. A. Bauer, in this issue.

† Licensed land surveyor, San Diego, Calif.

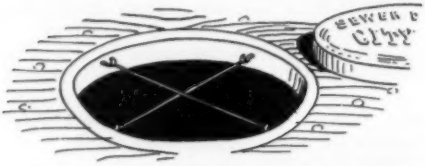
SEND IN THAT GOOD IDEA

R. B. IRWIN*—I admire our Journal and wish it an eternal existence as it is worthwhile and needed.

Would it be advantageous to try a column on good ideas contributed by the members? The title could be something like "Let's Hear From You," "Good Ideas From the ACSM," "Our Ideas Combined are Fine," or "Your Forum For Us." The subject matter could be symbols, sights, short cuts, terminology, ideas, or local methods. It would be very easy for me to furnish data to get the ball rolling and I would like to help in any way if you deem the suggestion worthwhile. Here are some samples:

(1) Set rock on lath sight; if hit by car or cow the gunner could tell.

(2) When intersection of road centerlines falls over a manhole, place hooks in manhole wall at 90° so that by removing cover and use of rubber



(Illustration by C. E. Grossman)

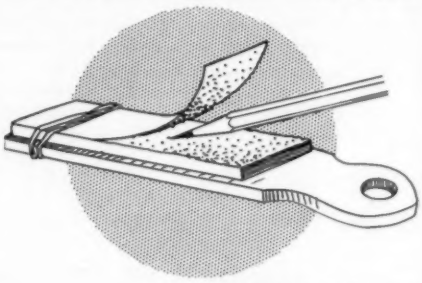
bands or bob string, intersection of centerlines is available.

(3) Support reading glass on a string around neck if in constant use. Stick it inside shirt to keep it from getting in way when bending over.

(4) Set lead and screw (or spike) bench mark in curb flush by chiseling curb to allow Philadelphia rod to be set on it. This prevents grader blade from removing your bench mark.

(5) Index peg and field books are a good investment.

(6) On pencil scratcher reverse top sheet and hold on by tack or rubber bands—twice as quick.



(Illustration by C. E. Grossman)

If in the office, try stapling a wad of cotton on the scratcher to clean pencil.

(7) Star drills now come with rubber handles and guard for the cautious.

(8) Use small metal pie pan to clean out dirt or water from survey points. A rag gets that last bit of water out.

(9) Show appreciation or smile "thank you" to motorist inconvenienced or obedient to safety precautions.

There are lots of others and a little humor mixed in would help. The contributors could be asked to "just drop us a card with your idea." Anyway, "nothing ventured, nothing gained."

CHAIRMAN, PUBLICATIONS COMMITTEE—The Publications Committee likes Mr. Irwin's idea and will welcome short cuts and tricks of the trade submitted by the members for publication in the Comment and Discussion department. Contributors should keep in mind that a simple, neat sketch is a great help in getting the idea across.

* Water Department, Los Angeles, Calif.

TRANSMISSION TOWERS AS CONTROL SURVEY POINTS

GEORGE W. CASSELL*—Readers of the caption under the photograph on page 418 of the October–December [1953] issue may wonder how to "select" a high tension transmission tower "with a vertical crosshair." Perhaps the misprint is fortunate, even though it may not be immediately obvious that "select" should read "bisect," because it gives this opportunity to call attention again to the possibilities of using towers as survey points.

The Maryland Bureau of Control Surveys

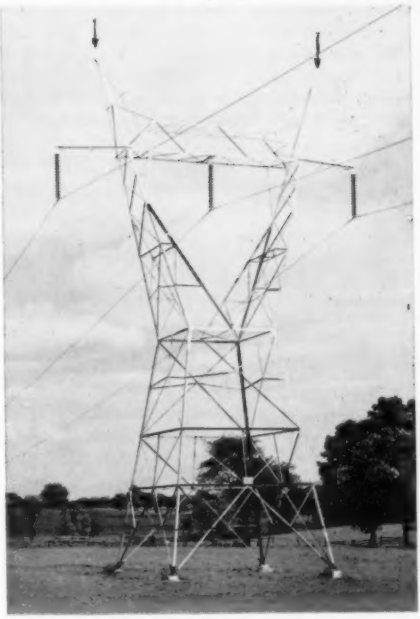
* Engineer-in-Charge, Bureau of Control Surveys and Maps, State of Maryland, Baltimore, Md.

and Maps has been experimenting for a number of years and has come to the conclusion that towers of this kind can be safely used and offer many advantages, providing proper precautions are exercised. One of these is, not to try to sight on the tower as a whole, attempting to bisect the structure with the crosshair, but to sight separately on two symmetrically opposite points. When the accuracy of observation is limited by the horizontal circle, as in the ordinary minute transit, the second sight is an advantage, since the accuracy can thus be improved by 40 percent by averaging the two separate readings.

In the case of the type of tower illustrated, it is better to sight on the ground wire supports [indicated by arrows in the illustration] rather than upon the insulators of the power cables, because on angle towers where the line changes direction the outside insulator is extended to provide the necessary clearance between wire and steel around the bend.

Land surveyors in this State are becoming increasingly interested in the advantages of tying-in to coordinated surveys of power lines.

(EDITOR'S NOTE.—Our thanks to alert reader Cassell for giving us this opportunity to correct the error. "Bisect" was the word intended.)



SURVEYS SHOULD OUTLIVE THE SURVEYOR

C. A. WOOLDRIDGE, JR.*—The recent death of my grandfather, Col. C. M. Anderson, one of the early surveyors in and around Seattle, Wash., brings to mind two often-repeated questions: Have you made a will? Have you left your mark in the world?

I know that I am not the only one to have trouble reestablishing an old property line. Nor am I the only one to have difficulty determining the proper dimensions, ties, and references. Nor am I the only one to attempt to trace the original surveyor's notes.

In this latter respect, the original notes may at times still exist on the shelves of the descendants. Occasionally they may be found in some public office. But usually they have been destroyed. Frequently a surveyor's widow will know the value of such work and faithfully preserve the field books. But after her death the children will go through the remains, often in preparation to dispose of the property, and decide "It's just part of Dad's old work. It can't have any value, look at the date. It's thirty years old." So the books are burned or thrown away. If they felt there was possible value, an attempt to sell them would prove otherwise.

But your notes, and those you inherited from your father and grandfather, can be preserved, even if you have no partner or descendant to carry on your business. The latter, of course, is desirable, but many times not feasible.

Many of the city, county, or State engineering offices have provision to preserve worth-

* Vice Chairman, Northern California Section, ACSM.

while survey data. (Some title insurance companies will also be interested.) They are unable to pay for such records, but can accept them free of charge and will preserve them as public records. Your name will live forever and, more important, your work will not be lost.

How can this be done? Simple! A few moments of your time to discuss the subject when you are in the various public offices will obtain the information you need to decide which office is best prepared to preserve your records. Then a clause in your will, dedicating your field books and plats to the public to be kept in the designated office, will be a fact accomplished. How else can you be certain of the preservation of your work, unless you have a partner to carry on?

STATE COORDINATES FOR LAND SURVEYS

GEORGE M. PAGE*—The following statement has been submitted to the planning commissions in this area on the subject of State coordinates for land surveys:

RECOMMENDATIONS.—In reference to the north point and the bearings of land lines in new subdivisions, I recommend that all such bearings be based on the Ohio Coordinate System, South Zone. If this is believed to entail undue hardship in some cases, such a requirement could be limited to locations where new subdivisions are within 2,000 feet of established public monuments.

I also recommend, again where public monuments are within 2,000 feet, that private surveyors be required to establish State coordinates on at least two permanent marks in new subdivisions for future use by county and city engineers, in preparing land plats.

COMMENTS.—In support of the above recommendations, I submit that land is becoming more and more valuable. Land surveying by the old established customs of frontier days is no longer adequate, and disrespect or carelessness in the matter of land lines should not be tolerated.

In many areas of the United States, including counties within this State, surveying by outmoded methods without reference to established bearings is necessary because of the high costs involved in referencing to established monuments. Also, the determination of meridian by observation on the sun or other astronomical bodies, while not a difficult operation for modern surveyors, entails some costs and may not be economical for surveying inexpensive rural land. However, in this county, approximately 2,000 public monuments, referenced to the State coordinate system, have been established in connection with the county topographic mapping project. The monuments make the coordinate system readily available for practically all land surveys and in many cases are now being used for elevations.

Surveying by coordinates is the modern and professional way to do the work. Records of coordinates are permanent and even if all marks in a subdivision are destroyed, relocation may be established with accuracy. The ordinary citizen is of the opinion that there is only one direction that is north. This is a reasonable assumption and, by tying to a common reference, could be achieved. It is ludicrous for one straight line to have two or more bearings because adjoining property is referenced to different north points.

The cost of tying new subdivisions to the coordinate system, when computed on a per lot basis, is negligible. Such costs, ordinarily, should not exceed $50.00 which, on a 20-lot subdivision, would amount to $2.50 per lot. In my opinion, great accuracy of traverse ties such as 1 to 10,000 is not required. Accuracy of 1 to 2,500 or 1 to 3,000 should be sufficient between public monuments, except where very valuable property is involved.

Surveyors in this State are licensed. They have professional status and, presumably, ability to perform a reasonable amount of calculations. The mathematics involved in coordinate surveying is relatively simple. In event the Planning Commission has difficulty in understanding the mathematics involved, I will gladly assist in the development of forms and procedures for calculations.

In reply to the statement that the use of the State coordinate system is not practical, I wish to state that I am now using it on new subdivisions without entailing excessive costs.

Surveyors are now *professionals* and should take pride in their work to the extent that they perform a professional job. Land surveying should progress in the same manner as other professions have progressed. In planning for the future, public agencies, such as the one you head, should provide rules for accurate and consistent land surveys.

* Licensed Surveyor, Cincinnati, Ohio.

News of Related Organizations

Florida Surveyors Meet

The 1953 Highway and Surveying Conference, sponsored by the Civil Engineering Department of the University of Florida, was held at Gainesville on November 19 and 20. Among the many interesting papers given at the 2-day session were the following talks delivered by ACSM members: "Research in Surveying and Mapping" by George H. Harding; "Uncle Sam —Surveyor and Administrator of the Public Domain" by Norville E. Shearer; "Industry's Problems in Land Surveying" by Jack S. Toley; and "Florida's Mapping Program" by Daniel Kennedy.

John P. Goggin presided over the Friday surveying sessions in his capacity as Chairman of the Surveying and Mapping Section, Florida Engineering Society.

Georgia Land Surveyors Publish Yearbook

The *1953–1954 Yearbook* of the Georgia Association of Registered Land Surveyors, the first to be published by that organization, was distributed to members in January 1954. The attractive publication, in convenient pocket size, lists the officers, directors, and committee members of the association. The names and addresses of all members and sustaining members are tabulated. A historical piece traces the events leading to the establishment of the association and its accomplishments to date. Finally, the constitution of the organization is presented in full.

Wisconsin Society of Land Surveyors

The annual meeting of the Wisconsin Society of Land Surveyors was held in Madison on the evening of December 2 on the campus of the University of Wisconsin.

Results of a mail ballot were announced at the meeting which showed that the members had voted 49 to 1 in favor of affiliation with the ACSM.

As President Richard B. Mecha was unable to be present at the meeting because of illness, a message was read from him in which he cited the responsibilities of the individual surveyor in rebuilding and advancing the surveying profession.

With Vice-President Otho Bergman presiding, reports were heard from the various committees, after which elections were held with the following officers being selected:

Karl W. Fuge, *President*
Robert P. Hall, *Vice-president*
H. A. Kallsen, *Secretary-Treasurer*
R. P. Boyd, *Director*
James Eide, *Director*
C. W. Rollman, *Director*

Thirty-eight men, many of them members of WSLS, plus a dozen conference leaders, attended the 3-day sessions of the Fifth Surveyors Institute, sponsored by the University of Wisconsin Extension Division, on December 1, 2, and 3. Such varied subjects as survey computations, regulatory laws, and the preservation

of land monuments were discussed. Those attending had an opportunity to examine surveying equipment displayed by six different firms.

A resolution was transmitted by WSLS on December 17, 1953, to the Legislative Interim Committee of the State Legislature requesting a hearing for the WSLS before the committee on the subject of land surveying problems. A resolution concerning the preservation of monuments was also drafted for consideration by the Board of Directors for transmittal to the Wisconsin Highway Commission.

Refresher Course Held at V.M.I.

The Fifth Annual Refresher Course for Surveyors was conducted by the Department of Civil Engineering of Virginia Military Institute on January 25–29, 1954. The course was sponsored by the Virginia Department of Highways, the Virginia Association of Surveyors, the League of Virginia Municipalities, and the Division of Trade and Industrial Education of the State Board of Education.

The course comprised ten hours instruction in each of the following subjects: Land Surveying, Photogrammetry, and Theory of Curves.

Land Surveying subjects included trigonometry, area computations, solar observations and the use of State plane coordinates.

Photogrammetry covered basic principles, photo interpretation, and map compilation using stereoscopic instruments and aerial photographs.

Theory of Curves classes discussed vertical and horizontal curves, superelevation, compound curves, and spirals.

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Three scales in view

Vertical Angle in degrees and minutes

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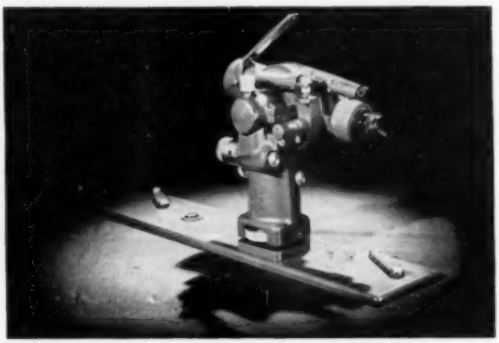

III.

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IV.

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CONGRESS NEWS

New Technical Division Officers

As the result of recent elections, the ACSM Technical Divisions report the following officers for 1954:

CARTOGRAPHY DIVISION
Arthur F. Striker, *Chairman*

Directors

Herbert Norton
Robert H. Randall, Jr.
Roscoe Reeves

CONTROL SURVEYS DIVISION
Albert J Hoskinson, *Chairman*

Directors

Prof. Milton O. Schmidt (1954–55)
E. D. Morse (1954–56)

The Topography Division will elect 1954 officers of the 14th Annual Meeting in March.

EDUCATION DIVISION
Prof. Henry B. Aikin, *Chairman*

Directors

Brother B. Austin Barry (1954–55)
Prof. Harmer A. Weeden (1954–56)

INSTRUMENTS DIVISION
Louis H. Berger, *Chairman*
C. A. Thorpe, *Secretary*

PROPERTY SURVEYS DIVISION*
William B. Williams, *Chairman*
Gordon E. Ainsworth, *Vice Chairman*
Robert L. McCammon, *Secretary-Treasurer*
Prof. Frank Mirgain, *Division Editor*

* The 1954 officers for the Property Surveys Division have not yet been elected—the election will be held at the Division sessions at the 14th Annual Meeting. The officers listed represent the unopposed slate of candidates.

Texas Section

The Texas Section reports the following as 1954 officers and directors:

W. H. Wilson, *Chairman*
L. E. Cornitius, *1st Vice Chairman*
Edward G. Pearson, *2nd Vice Chairman*
L. P. Carr, *3rd Vice Chairman*
K. E. Brittain, *Secretary*
R. K. Daley, *Treasurer*

Directors

Forrest Daniell Joe A. Hicks, Jr.
J. D. Ehman John O. Phillips
R. L. Sargent

—Hodge E. Mason

Northern California Section

The following election results for 1954 officers were recently announced by the Property Surveys Division of the Northern California Section:

G. C. Bestor, *Chairman*
Roy Briggs, *Vice Chairman*
F. H. Moffitt, *Vice Chairman*
H. A. Sandlin, *Vice Chairman*
D. H. Dean, *Secretary-Treasurer*

(The list of Section officers and directors was published in the October–December 1953 issue. —Ed.)

Southern California Section

A cartographic display was presented by the Southern California Section in the Los Angeles City Hall on November 7. This interesting exhibit, assembled by Howard R. Saunders,

(Photo by W. H. Watts)

AN INTERESTED GROUP INSPECTS AN OPTICAL TRANSIT AT THE CARTOGRAPHIC DISPLAY.

demonstrated the latest developments in field and office instruments and techniques.

The annual banquet, held December 8 at the Rodger Young Auditorium, featured an illustrated talk by Dean Walling of Western Geophysical Co., describing offshore seismic surveying along the southern California coast.

The following Section officers and directors were elected for 1954:

Officers

Charles R. Herr, *President*
W. C. Meek, *Vice President*
Don Jones, *Secretary*
J. H. Anderson, *Treasurer*
Fritz Schafer, *Section Editor*

Directors

John E. Asher — George A. Greenwald, Jr.
Henry H. Beitler — Morton H. Kibbe

Lt. Comdr. Daniel E. Whelan was awarded an Honorary Membership certificate.

The Section plans to widen its scope in 1954

(Photo by W. H. Watts)

THE PHOTOGRAPHER'S DAUGHTER DEMONSTRATES A UNIQUE METHOD OF GRIPPING THE ALIDADE.

to cover more activities, such as the recent cartographic display, and to increase its membership among engineers and draftsmen in the southern California area.

JOHN E. ASHER

* * *

FOURTEENTH ANNUAL MEETING, MARCH 22–24, 1954, WASH., D. C.

International Congress of Surveyors

The 8th International Congress of Surveyors, sponsored by the International Federation of Surveyors, was held in Paris from August 28 to September 6, 1953. This meeting was attended by delegates from 15 member-countries in addition to a number of observers from 6 non-member nations.

Assembled delegates heard reports from six technical commissions, following four days of technical discussions within each group. These commissions reported on the following subjects: Commission I, Technical Dictionary; Commission II, Cadastral Surveys and Reapportionment of Rural Land; Commission III, Cartography, Instruments and Photogrammetry; Commission IV, Town Planning, Reconstructions, City Subdivision; Commission V, Young Surveyors and Teaching; and Commission VI, Salaries and Professional Activities.

Exhibits at the meeting included an historical display of surveying progress; map exhibits by government agencies of the various countries; a special group of French exhibits by the Cadastral Service, the City of Paris, Polar Expeditions, L'Institut Géographique National, and others; and commercial exhibits by many European manufacturers of surveying and drafting equipment.

Technical meetings were held on September 1 at which delegates heard reports from engineer-geographers of L'Institut Géographique National, describing geodetic operations in southern France and the use of photogrammetry in the preparation of the 1:20,000 scale maps of France.

On September 2 the delegates heard a description of a new simplified apparatus, utilizing two phototheodolites, for use in land surveying.

Field trips were made to the geodetic and photogrammetric laboratories of the I. G. N., to Creil and Bourget airfields, and to the French Cadastral Service offices.

A more detailed account of the meeting will be given by ACSM past-President, Marshall S. Wright, at the 14th Annual Meeting. Mr. Wright, in Paris on business during the meeting, served as ACSM representative.

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Personals

Sol A. Bauer, Chairman of ACSM Professional Status Committee, spoke for ACSM at the Michigan Society of Registered Land Surveyors Annual Meeting at Grand Rapids, Mich., February 20, 1954. Attendance from Ohio, Wisconsin, Illinois and Indiana is expected at the Michigan meeting.

Gordon B. Littlepage, Chief of Reproduction Branch, USC&GS, represented ACSM at the 47th Annual Meeting of the Canadian Institute of Surveying and Photogrammetry at Ottawa, Canada, February 3, 4, and 5, 1954.

Joseph P. Burns has resigned from the Geological Survey to accept a position with Mark Hurd Aerial Surveys, Inc., in Minneapolis. During the past year Mr. Burns has served as an assistant editor of SURVEYING AND MAPPING.

Harry A. Marmer, former Assistant Chief, Division of Tides and Currents, U. S. Coast and Geodetic Survey, died on November 5, 1953, at George Washington Hospital, Washington, D. C. Mr. Marmer retired from the Coast and Geodetic Survey at the end of August after an outstanding career covering a period of 46 years.

Born in Proskurof, Ukraine (Russia), in 1885, Mr. Marmer came to the United States in 1889. He was graduated from Rutgers University in 1907 with a B.S. degree in engineering and that year entered on duty with the Coast and Geodetic Survey where he devoted his entire professional career. In 1931, Mr. Marmer received a M.S. degree from Rutgers University.

During his long years of service with the Bureau, Mr. Marmer won international recognition as expert consultant in the fields of tides, currents, tidal datum planes, and related oceanographic subjects. Mr. Marmer was author of two books entitled "The Tide" and "The Sea," recognized as standard texts. He was also author of many Bureau publications, and numerous ar-

ticles written by Mr. Marmer on tides, currents, and general oceanography have appeared in various journals and magazines in this country and abroad.

Mr. Marmer was the recipient of many awards and citations, the most notable being the Alexander Agassiz Medal which was awarded him by the National Academy of Sciences for original contribution in the science of oceanography. He also received the 1949 Department of Commerce Gold Medal for exceptional service to the nation.

Besides the ACSM, Mr. Marmer maintained active membership in the American Association for the Advancement of Science, American Society of Civil Engineers, Association of American Geographers, American Geophysical Union, Washington Philosophical Society, Cosmos Club, and the U. S. Naval Institute.

In commemoration of Lt. (jg) Gordon D. Scott, USC&GS, who lost his life in the service of his country while engaged in surveying operations in Mount McKinley Park, Alaska, the U. S. Board on Geographic Names has approved a recommendation that one of the mountains located near the scene of the fatal accident be named *Scott Peak*. The original proposal was made by Bradford Washburn, Director, Boston Museum of Science, and concurred in by the Coast and Geodetic Survey and other agencies. The peak, with an elevation of about 8,800 feet, is located in Mount McKinley Park, approximately 33 miles northeast of Mount McKinley.

The death of Lt. Scott on an aerial-mapping mission in Alaska remains as an example of the dangerous conditions encountered over the years in surveying and mapping some of the most difficult terrain on earth. Foggy and unfavorable weather with high winds make all flying operations in Alaska hazardous. On June 11, 1953, the Piper cub carrying Lt. Scott and piloted by Knute H. Bergh, of Bellingham, Wash., crashed against a hill in Mount McKinley Park as the plane was returning to camp from a flight check. Both occupants of the plane were killed.

Lt. Scott entered the service of the Coast and Geodetic Survey on April 21, 1948. His assignments with the bureau included service aboard the USC&GS ship *Pathfinder* in Alaska, Arctic survey parties in the Point Barrow area, and field parties in Texas, Colorado, Kansas, and Nevada.

The Congress notes with regret the recent death of Peter L. Pfleiderer, of Freeport, N. Y. Mr. Pfleiderer, a civil engineer and surveyor with offices in Roosevelt, N. Y., was an enthusiastic member of ACSM. He believed that we should encourage the young men in the field parties to join the Congress and took out memberships for the key men in his own field parties. He attended annual meetings of the Congress and took an active part in Property Surveys Division meeting activities.

John R. Fitzgerald, Chief of the U. S. Charts Section, Aeronautical Chart Branch, Division of Charts, retired from the Coast and Geodetic Survey on January 31, 1954, after more than 35 years of government service.

Mr. Fitzgerald entered government service in 1918 with the Corps of Engineers Reproduction Plant (now Army Map Service). In 1927, he transferred to the Coast and Geodetic Survey and was assigned to the newly organized Airway Mapping Section (now the Aeronautical Chart Branch) where he has served since.

Pioneering in aeronautical charting activities, Mr. Fitzgerald compiled the first aeronautical chart published by the Coast and Geodetic Survey. Since that beginning he has had an important part in the progressive development of aeronautical charts from local strip maps of extremely limited use to the many series of specialized aeronautical charts without which modern aviation could not function.

In 1953 Mr. Fitzgerald received the Department of Commerce Meritorious Service Award for outstanding pioneer and development work in the evolution of aeronautical charts.

THE FOURTEENTH ANNUAL MEETING AND EXHIBITS
March 22, 23, and 24, 1954, Washington, D. C.

Annual Financial Statement

(As of December 31, 1953)

INCOME

Dues and memberships received	*1952*	*1953*	*Year ending 12/31/52*	*Year ending 12/31/53*	*Differences*
Individual	2685	2902	$13,535.21	$14,722.41	+$ 1,187.20
Library	209	256	899.91	1,063.50	+ 163.59
Sustaining	16	12	500.00	325.00	– *175.00*
Previous year's dues			48.00	219.00	+ 171.00
Total	2910	3152			
Total gross regular income			$14,983.12	$16,329.91	+$ 1,346.79
Deduct membership costs			– *1,611.87*	– *1,699.50*	– *87.63*
Net regular income			13,371.25	14,630.41	+ 1,259.16
Publication sales			379.57	294.17	– *85.40*
Advertising profit			0.00	1,887.32	+ 1,887.32
Annual meeting and other income			3,850.14	250.99	– *3,599.15*
OPERATING INCOME			$17,600.96	$17,062.89	–$ *538.07*

EXPENDITURES

Journal (all expenses)	$10,439.94	$12,854.08	+$ 2,414.14
Other printing	153.92	41.90	– *112.02*
Office supplies and Secretary's and Treasurer's expenses	1,078.25	773.30	– *304.95*
Technical Divisions	157.95	75.55	– *82.40*
Other expenditures authorized by the Board of Direction	166.93	221.46	+ 54.53
TOTAL EXPENDITURES	$11,996.99	$13,966.29	+$ 1,969.30
PROFIT	$ 5,603.97	$ 3,096.60	–$ 2,507.37

ASSETS

Bank balance	$ 372.77	$ 2,301.80	+$ 1,929.03
Bonds and Savings Account	12,055.00	15,055.00	+ 3,000.00
Journal (back issues—estimated)	300.00	300.00	0.00
Advance payments	589.10	1,368.85	+ 779.75
Accounts receivable	$400.00	186.50	– *213.50*
TOTAL ASSETS	$13,716.87	$19,212.15	+$ 5,495.28

LIABILITIES AND NET WORTH

Advance dues paid	$ 900.12	$ 998.80	+$ 98.68
Exhibit space	00.00	2,300.00	+ 2,300.00
Other accounts payable	0.00	0.00	0.00
TOTAL LIABILITIES	$ 900.12	$ 3,298.90	+$ 2,398.68
NET WORTH	$12,816.75	$15,913.35	+$ 3,096.60

JOHN M. AMSTADT, *Chairman*
Budget and Finance

NEW MEMBERS

INDIVIDUAL MEMBERSHIPS

ALLEN, John J., Jr., 8708 Reading Rd., Silver Spring, Md.—Land Surveyor

ATKINSON, Frank L., U. S. Geological Survey, Box 346, Sacramento, Calif.—Cartographic Compilation Aid

BARTENSTEIN, John H., 121 Culpeper St., Warrenton, Va.—Civil Engineer and Surveyor, R. M. Bartenstein Engineering Co.

BECERRA-CANAL, Alvaro, 4846 N. 9th St., Arlington, Va.—Photogrammetric Technician, Geographic Institute of Colombia

BELL, Philip R., c/o Pusom, Case Postale 879, Fr. Morocco, Africa—Chief of Party, Porter, Urquhart, Skidmore, Owings, and Merrill

BIGGS, J. E., Jr., 2326 12th St., Vernon, Tex.—Engineer, W. T. Wagoner Estate

BILLINGTON, James C., 2655 Darwin St., Sacramento 21, Calif.—Cartographer, U. S. Geological Survey

BLACK, Richard L., 4505 Morris Ct., Fort Worth, Tex.—Surveyor, West Surveying Co.

BLANEY, Franklin J., Box 43, Wadsworth, Ohio—Civil Engineer

BONE, Ronald C., 3315 E. Gage Ave., Huntington Park, Calif.—Surveyor

BOURNE, Ernest E., 2119 Bluebird Lane, Sacramento, Calif.—Junior Civil Engineer, East Bay Municipal Utility District

BOYNTON, James C., 28 Church St., Whitman, Mass.—Supt., Public Works

BREEN, Edward I., R. F. D. No. 1, Box 116-A, Arlington, Tex.—Asst. Chief of Surveys, Corps of Engineers, USA

BROAD, Harry R., 36215 Edman St., Mt. Clemens, Mich.—Broad Crane and Engineering Service Co.

BRUSH, Prof. John E., 5 Marvin Lane, University Heights, New Brunswick, N. J.—Assistant Professor, Dept. of Geography, Rutgers University

CADIGON, Edward L., 51 Commercial St., Adams, Mass.—Project Planner and Estimator, General Electric Co.

CARNES, William E., No. 2 Port St., Pulaski, N. Y.—Engineer

CAULFIELD, Samuel J., 2420 Wilson Blvd., Arlington, Va.—Proprietor, Samuel J. Caulfield, Civil Engineer

CICHONCZYK, Bruno, 66 Van Derveer Ave., Amsterdam, N. Y.—Rodman, Hamilton, Dykes and Williams, Inc.

COATS, Samuel T., P. O. Box 868, Livingston, Tex.—Land Surveyor and Timber Estimator, S. T. Coats and Son

CONNOR, A. B., 2402 Hermosa Dr., San Antonio 1, Tex.—Land Surveyor

CONNOR, Raymond F., 28 Otis St., Medford, Mass.—Civil Engineer, Private practice

COPAS, Thomas L., P. O. Box 8262, University of Tennessee, Knoxville, Tenn.—Engineering student

COWAN, John 202½ W. Erwin St., Tyler, Tex.—Land Surveyor

D'ARCY, Raymond A., 12 Harbor View Rd., Nahant, Mass.—Civil Engineer and Surveyor

DARLING, James W., 5 Church and Main Arcade, Orlando, Fla.—Owner, Kelly-Darling Engineering Services

DAVIDSON, Frank N., Box 161, Eagle Lake, Tex.—Surveyor

DAVIS, Allen C., 7 Brigham St., Fitchburg, Mass. Civil Engineer and Surveyor

DAVIS, Grant L., 44 Elm St., Dover, N. H.—G. L. Davis and Associates, Consulting Engineers

DELBONE, John P., College Highway, Avon, Conn.—Asst. Highway Engineer, Connecticut State Highway Dept.

DODD, Alfred B., General Delivery, Delta, Pa.—Cartographer, U. S. Geological Survey

EARLE, Ken, 6148 Auckland Ave., North Hollywood, Calif.—Land Surveyor

EHRHART, George, 233 Frederick St., Hanover, Pa.—Private Engineering practice

FAGERSTOM, L. Eugene, c/o V. L. Beavers & Associates, 209 Staples-Pake Bldg., Mobile, Ala.—Engineers, V. L. Beavers & Associates

FELDMAN, Harry R., 27 School St., Boston 8, Mass.—Owner, Harry L. Feldman, Engineering Service

FELLER, William B., R. F. D. No. 2, Conestoga, Pa.—Levelman, Safe Harbor Water Power Corp.

FERNANDES, J. A. Barahona, P. O. Box 288, Lourenco Marques, Portuguese East Africa—Director, Servicos Geographicose Cadastrais

FOX, Reuben L., 1215 Fannin St., Houston 2, Tex.—President, San Jacinto Blueprint Co.

GOULD, Maurice, 14715 69 Road, Flushing, N. Y.—Asst. Civil Engineer, Borough of Queens

HALL, Byrdwell, Box 2511, Houston, Tex.—Land Agent and Title Man

HARRINGTON, James H., 676 Worcester St., Wellesley 81, Mass.—Senior Civil Engineer, Metropolitan District Commission

HARRISON, W. Alan, 1200 L St., Bakersfield, Calif.—Land Surveyor

HERZIK, Adolph, Jr., Box 61, Corrigan, Tex.—Chief, Survey Party, Champion Paper and Fiber Co.

HUGHES, Robert, H., 204 Neill Bldg., Tyler, Tex.—Land Surveyor

KAULA, Capt. William M., 1129 A-4 E. C. Knight St., Fort Belvoir, Va.—523rd Engineer, Geodetic Survey Detachment

KAUMA, Toivo, R. F. D. No. 1, Chassell, Mich.—Student Surveyor

KING, B. D., Jr., 809 Pecan St., Wharton, Tex.—Deputy Surveyor, Wharton County, Tex.

KLOVE, Robert C., Bureau of the Census, Washington 25, D. C.—Geographer, Asst. Chief, Geography Division

KOOS, Neil, 3220 Morrow Ave., Waco, Tex.—Land Surveyor

LANE, Robert E., Box 2180, Houston, Tex.—Civil Engineer, Humble Oil and Refining Co.

LAUN, Lester L., Jr., Elkhart Lake, Wis.—Surveyor, Wisconsin State Highway Commission

LECOMPTE, Warren J., 116 Hathaway Pl., New Orleans 19, La.—Chief Draftsman, Louisiana Land and Exploration Co.

LEHM, Werner C., 18 Caleb Terrace, Woodland Apt., Wilmington 5, Del.—Surveyor and Civil Engineer

LILLIE, John, Sacramento Junior College, Sacramento, Calif.—Engineering Instructor

LILLIS, H. E., 612 27th St., Billings, Mont.—Manager, Lillis Engineering Co.

LOHR, John W., 4216 Las Cruces Way, Sacramento, 21, Calif.—Senior Delineator, Division of Beaches and Parks

LOOMIS, James P., 2122 Patricia Ave., West Los Angeles 25, Calif.—Survey Party Chief, Dept. of Water and Power, City of Los Angeles

LOSHAK, Moises, 1423 Nadeau Dr., Los Angeles, Calif.—Chief of Party for H. E. Tegart

LOWERY, L. L., Stewart Bldg., Galveston, Tex.—Land Surveyor

MATTHEWS, Charles M., Moultons Ridge, Exeter, N. H.—Research Associate, Boston University Physical Research Laboratory

McKENNA, George A., 815 Washington St., Newtonville, Mass.—Partner, Roland H. Barnes and Co.

McNAMARA, John S., 77 Summer St. Taunton, Mass.—Asst. Engineer, City Engineer's office

MEADOWCROFT, Miron C., Box 307, Parsippany, N. J.—Office Manager, Robert C. Edwards, Surveyor

MESSINGER, Henry M., 401 Jackson St., Bastrop, La.—Land Surveyor

MINTZER, Olin W., Civil Engineering Dept., Case Institute of Technology, Cleveland 6, Ohio—Asst. Professor, Case Institute of Technology

MOORE, W. T., 2-A Chase Ter., Shrewsbury, Mass.—Owner, W. T. Moore and Son

MORSE, Charles H., 180 Salem St., Haverhill, Mass.—Partner, Charles H. Morse and Son, Engineers

MOSES, Jack G., 1214 Oak St., Rockymount, Va.—Surveyor

NEFF, Henry C., 1st National Bank Bldg., Adams, Mass.—Civil Engineer and Land Surveyor

NISWANDER, Richard E., U. S. Coast and Geodetic Survey, Washington 25, D. C.—Editorial Asst. to Chief, Geographic Branch, USC&GS

PAFF, Harry L., 433 Forest Rd., Scotch Plains, N. J.—Engineer and Land Surveyor

PARKHURST, Robert B., Ipswich Rd., Boxford, Mass.—Surveyor, private practice

PARMENTER, Arthur N., 686 Main St., Shrewsbury, Mass.—Owner, Arthur N. Parmenter, Civil Engineer
PATTON, J. L., Sun Oil Co., P. O. Box 2831, Beaumont, Tex.—Manager, Civil Engineering Dept., Sun Oil Co.
PEARSON, George E., 24201 Hillview Dr., Los Altos, Calif.—Civil Engineer
PEELE, William T., 13119 Ardennes Ave., Rockville, Md.—Cartographer, National Geographic Society
PETTY, A. J., 7511 12th St., NW., Washington, D. C. —Compilation Aid, U. S. Geological Survey
PHILLIPS, John H., Jr., 132 Oxford Dr., Las Cruces, N. Mex.—Chief, Geodetic Control Section, White Sands Proving Ground
PUTERBAUGH, C. B., c/o Mary's Hospital, Baxter Springs, Kans.—Civil Engineer and Land Surveyor

QUAY, John H., 423 Mills Bldg., El Paso, Tex.—Chief, Survey Party, El Paso Natural Gas Co.

RICHARDSON, Guy R., 6360 Brooklyn Rd., Jackson, Mich.—Sec.-Treas., Universal Map Service, Ltd.
RING, Clifton A., 3561 Redwood Ave., Venice, Calif. —Asst. Engineer, Engineering Service Corp.
RODGERS, Robert E., 1041 N. Fillmore St., Arlington, Va.—Land Surveyor
RODRIGUEZ, Ezikiel D., 4652 Homer Ave., SE., Washington 23, D. C.—Cartographer, U. S. Hydrographic Office
ROWLEY, Walter E., Middleboro Rd., West Wareham, Mass.—Town Engineer
RYAN, Francis P., Northampton, Mass.—City Engineer

SKINNER, Percy H., 200 Massachusetts Ave., NW., Washington, D. C.—Chief of Surveying Party
SMITH, Alan R., 307 Memory Dr., Augusta, Ga.— Asst. Layout Engineer, E. I. Dupont Co.
SOEHNGEN, Prof. Henry F., 85 Livingston St., Brooklyn, N. Y.—Civil Engineering Dept., Brooklyn Polytechnic Institute
SOMPS, George E., 170 El Camino, Sunnyvale, Calif. —Civil Engineer, MacKay and Somps
SPENCER, Wilbur H., 140 Browning Ave., Trenton 8, N. J.—Principal Engineer (Bridges), N. J. Highway Dept.
SPILLER, H. B., Sun Oil Co., P. O. Box 2831, Beaumont, Tex.—Civil Engineer, Sun Oil Co.
STOWERS, Lawrence R., 11 Pelham St., P. O. Box 92, Methuen, Mass.—Registered Land Surveyor, Associate, Fred W. Stowers
STRASSER, William C., 126 W. 31st St., Wilmington, Del.—Field Engineer, E. and E. J. Pfotzer
STUART, Louis L., 1821 W. Main St., Apt. 9, Houston, Tex.—Junior Engineer, Phillips Petroleum Co.
SWIFT, Willaim F., Vineyard Haven, Mass.—Land Surveyor

THOMSON, Louis C., Western Gulf Oil Co., 1200 Statler Center, Los Angeles 17, Calif.—Surveying and Mapping Supervisor
TORRES, John B., 403 Riverside Dr., SW., Albuquerque, N. Mex.—Engineering Aid, Corps of Engineers, USA
TURNER, G. E., 826 Brandy Rd., Aiken, S. C.— Chief, Survey Party, E. I. Dupont Co.

WEAVER, Stanley M., P. O. Box 15, Oroville, Wash. —Registered Engineer, State of Washington
WEBSTER, Willard W., P. O. Box 1134, Williston, N. D.—Civil Engineer
WEBSTER, William O., 38 Poplar Pl., Fanwood, N. J.—Chief of Survey Party, Harry L. Paff, Civil Engineer
WHITE, Charles A., Box 124, Falmouth, Mass.— Civil Engineer, Town of Falmouth
WHITNEY, Charles, 11 Farmstead Lane, Farmington, Conn.—Engineering student, Worcester, Polytechnic
WILLIS, Charles O., Route 1, Chase City, Va.— Civil Engineer, Corps of Engineers, USA
WOODHOUSE, George G., 914 56th St., Sacramento, Calif.—Department of Natural Resources, State
WORLEY, C. T., 214 W. First Ave., Kennewick, Wash.—Owner, Worley Surveying and Engineering Service
of California

LIBRARY MEMBERSHIPS

BASE LIBRARY, 1st Computation Tech. Sq., 55th SR Wing, Forbes AFB, Topeka, Kans.
CENTRAL INTELLIGENCE AGENCY MAILROOM LIBRARY, 2430 E St., NW., Washington 25, D. C.
COMMERCIAL PRESS, INC., 35 Queens Road Central, Hong Kong
CONNELL INSTRUMENT CO., (PTY, Ltd.), P. O. Box 3954, Johannesburg, Transvaal, South Africa
DEPARTMENT OF EXTERNAL AFFAIRS, The Librarian, Canberra, A. C. T., Australia
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U. S. ATOMIC ENERGY COMMISSION, P. O. Box 30, Ansonia Station, New York 23, N. Y.
U. S. FOREST SERVICE, Division of Engineering, P. O. Box 4137, Portland, Oreg.
U. S. INFORMATION CENTER, American University, Tokyo, Japan
UNIVERSITY OF CAPE TOWN LIBRARY, Periodicals Department, Rondebosch, Cape Town, South Africa
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Analysis of Membership Interest

Analysis of the applications for membership of the 575 new members who joined the Congress between Jan. 1 and Dec. 15, 1953, shows that 427, or 74 percent of them, expressed a first preference for one of the twelve branches of surveying and mapping listed on the application blank.

The results of this analysis have been compared with the results of a similar analysis made about two years ago and published in the January-March 1952 issue. Expressed in percentages, the first preferences are as shown below:

	1953	*1951*
Property Surveys	41	42
Topographic and Aerial Surveys	15	22
Control Surveys	14	9
Cartography	11	16
Construction Surveys	8	5
All others	11	6

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Oregon Supreme Court Holds Surveyor Need Not Be Registered

THE Supreme Court of Oregon has reversed a lower court holding that an act of the legislature requiring county surveyors to be registered as professional engineers or land surveyors is valid. The case arose out of the election in November 1952, of Peter W. Welch as Multnomah County Surveyor. Welch was not registered as a professional engineer or surveyor and his right to hold the office was successfully challenged before the Multnomah County Circuit Court on the ground that an act of the legislature, supplementing the constitutional requirements for the office, required registration.

Welch appealed on the ground that the State Constitution itself provides the qualifications for the office and therefore the legislature is powerless to prescribe additional requirements. The State Supreme Court agreed with this contention, holding the general rule of law well established that where a State Constitution provides for certain officials and names the qualifications for such officers, the legislature is without authority to prescribe additional qualifications unless the constitution, either expressly or by implication, gives the legislature such power. The Court cited an array of cases in support of this principle, quoting Chief Justice Vanderbilt of New Jersey in a landmark case, "From the very nature of such a provision the affirmation of these qualifications would seem to imply a negative of all others. . . . A power to add new qualifications is certainly equivalent to the power to vary them."

The high court accordingly declared that Welch is entitled to the office of county surveyor to which he was elected.—*American Engineer,* September 1953.

❦ ❦ ❦

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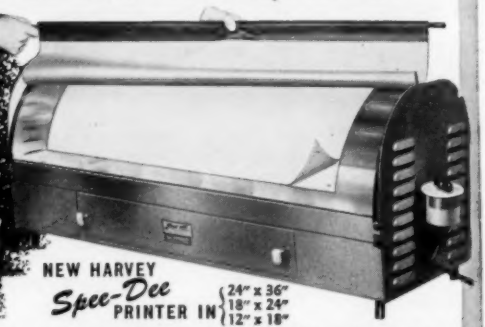

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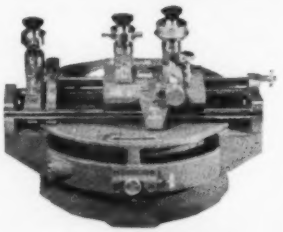

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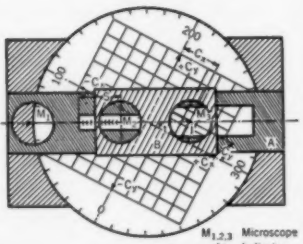

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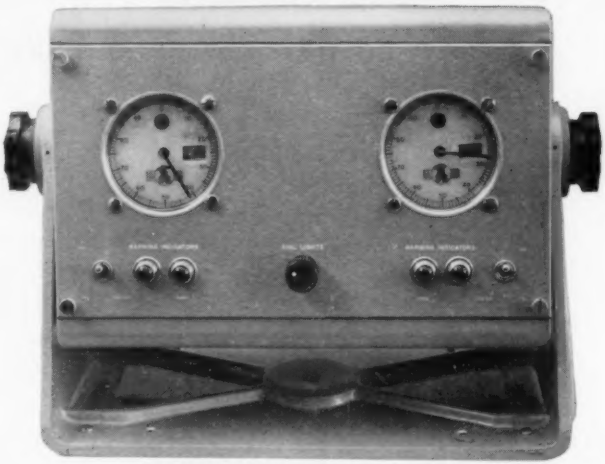

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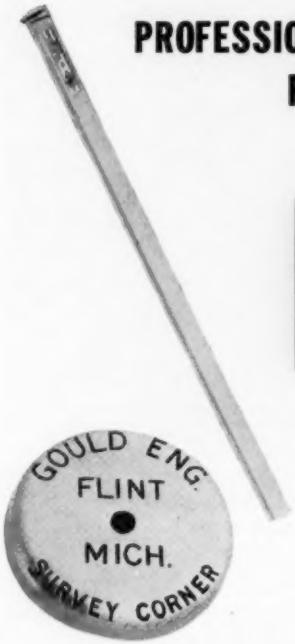

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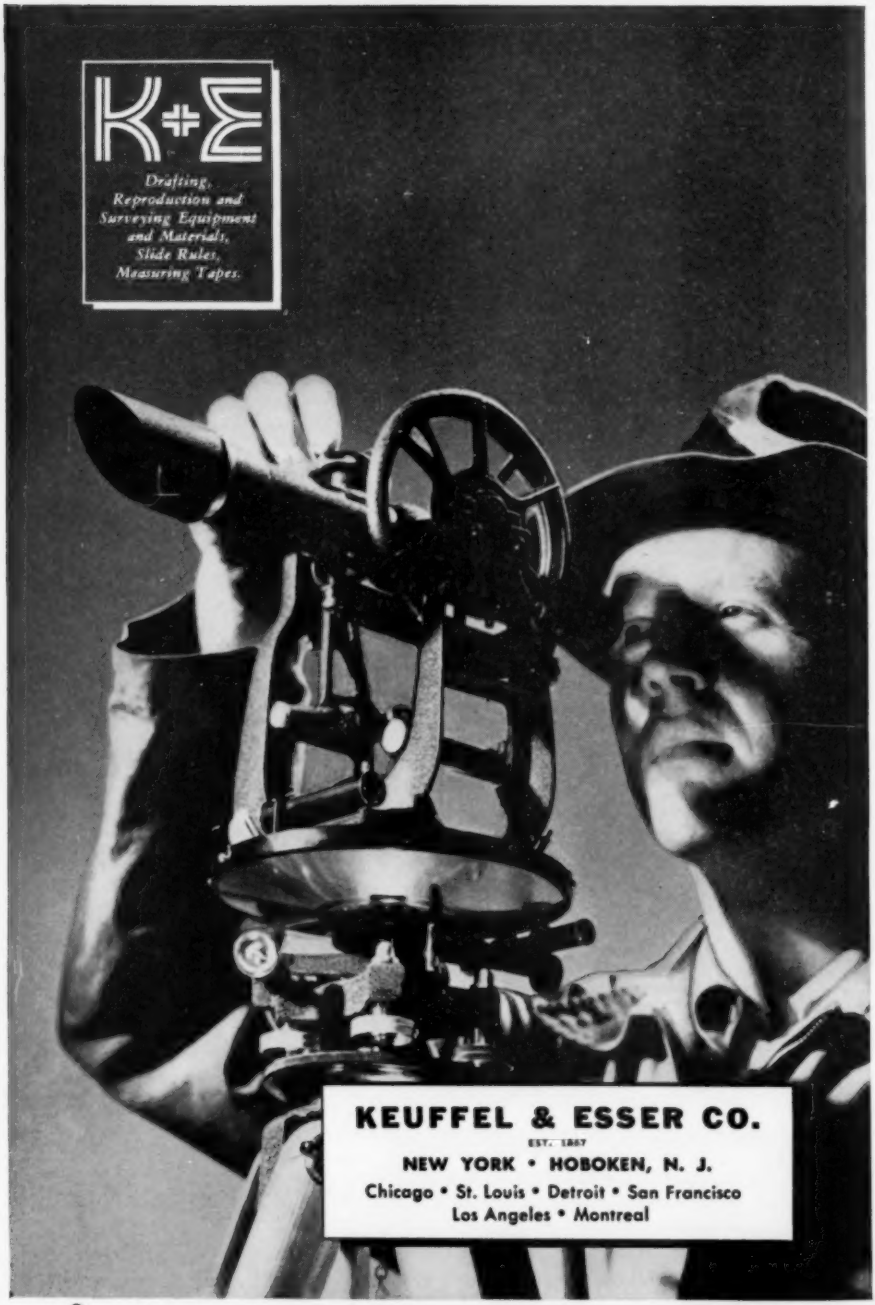
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